DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

REA

AWARDED TO

M&A ELECTRIC COOPERATIVE
FOR GREEN FOREST PLANT,
POPLAR BLUFF, MO.
DIVISION B 1956

FOR THE
MOST EFFICIENTLY OPERATED OF ALL
REA INTERNAL COMBUSTION PLANTS

DIESEL PROGRESS

REX W WADMAN
EDITOR & PUBLISHER

REA

AWARDED TO

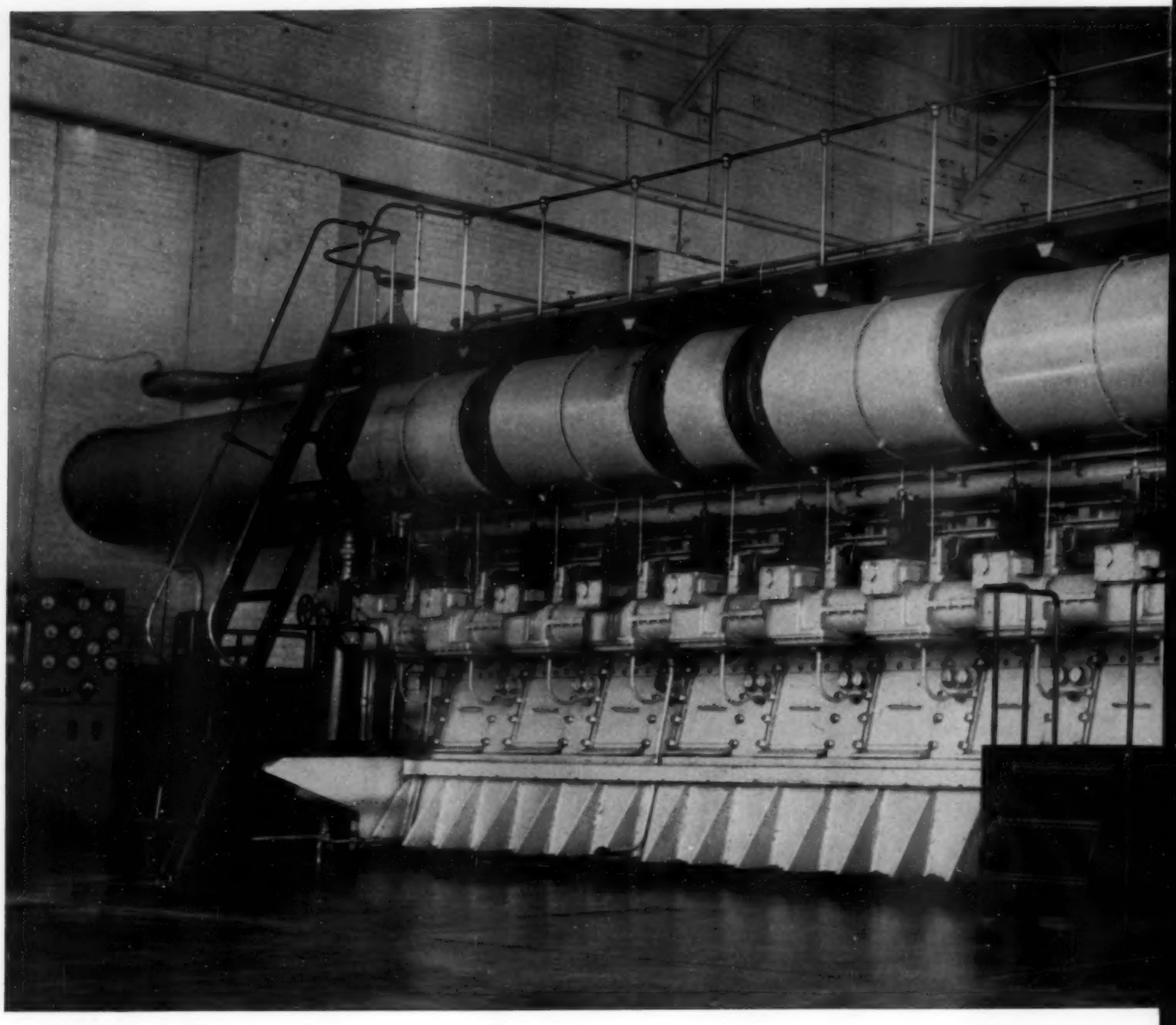
THUMB ELECTRIC CO-OPERATIVE
UBLY, MICHIGAN
FOR THE CARO PLANT
DIVISION A 1956

FOR THE
MOST EFFICIENTLY OPERATED OF ALL
REA INTERNAL COMBUSTION PLANTS

DIESEL PROGRESS

REX W WADMAN
EDITOR & PUBLISHER

FIVE DOLLARS PER YEAR MAY, 1957 FIFTY CENTS PER COPY



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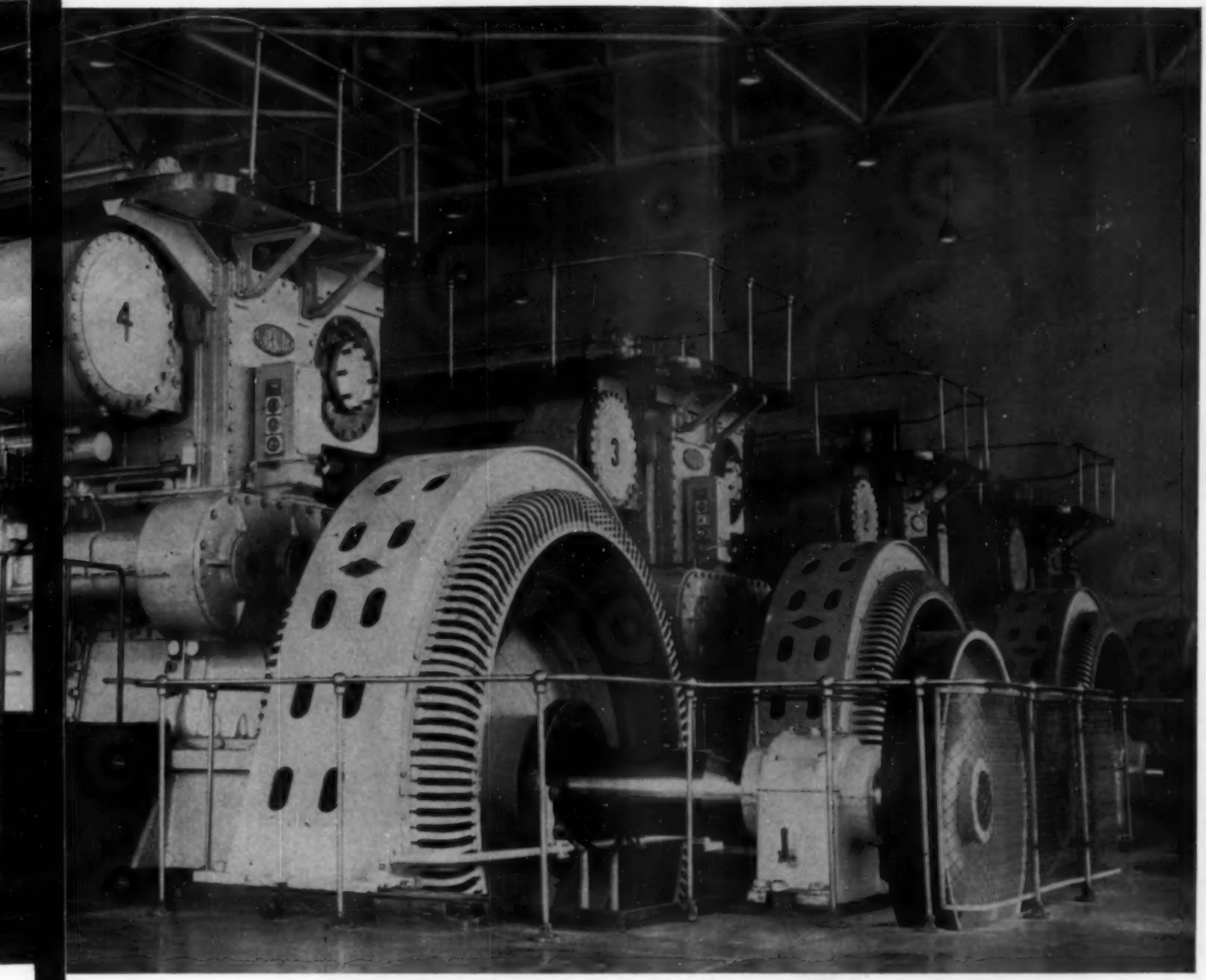


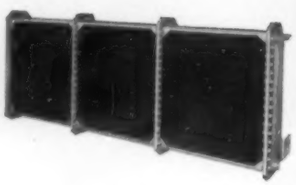
to your diesels on less fuel

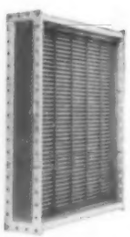
fuel engines; they are working oils whose detergent and dispersive actions protect moving parts from rust, oxidation and abrasion, help deliver more power on less fuel and at a greater saving in maintenance cost.

Let a Texaco Lubrication Engineer show you which *Texaco Ursa Oil* can help your engines to deliver more, clean power on less fuel. You can reach him at one of the more than 2,000 Texaco Distributing Plants in the 48 States—or by writing to The Texas Company, 135 East 42nd Street, New York 17, N. Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

Cool trail for the Rocket!





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The Rocket's en route . . . and right on schedule! The Rock Island's famous streamliner blazes by village and town . . . racing with time . . . and on top of the heat *all the time.* For Harrison tracks down temperatures for the long haul. These heavy-duty lube oil and jacket water coolers keep heat down . . . keep engines running at peak performance. Harrison coolers are rugged, reliable and compact . . . ready for duty on today's most modern diesel engines. That's why Harrison heat exchangers ride the majority of modern locomotives today. If you have a cooling problem, look to Harrison for the answer.

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GM GENERAL MOTORS

HARRISON

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IN INDUSTRY · IN TRANSPORTATION · ON THE SEA · IN THE AIR

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FRONT COVER ILLUSTRATION

The two DIESEL PROGRESS plaques presented to the Caro, Mich. plant of the Thumb Electric Coop and the Green Forest Plant of the M. & A. Electric Power Coop. See pages 12 and 44-50 of this issue.

since th

Cooper

1951

1952

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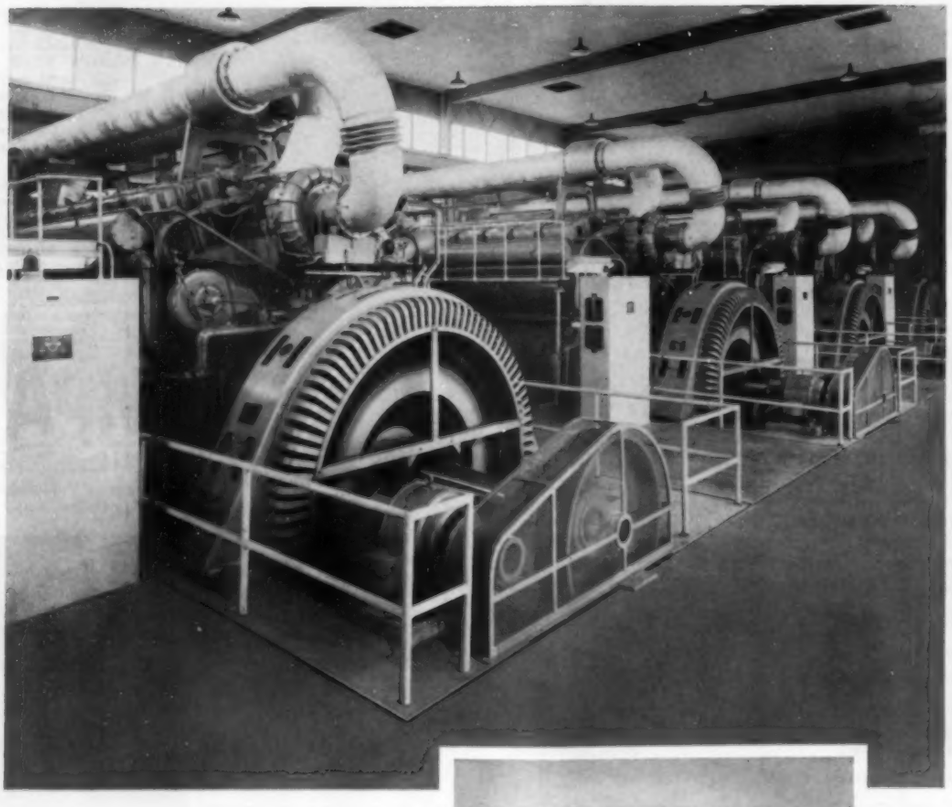
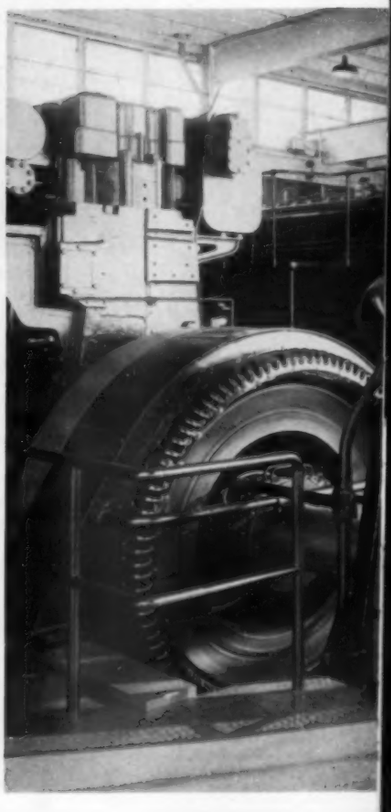


Three time winner of the Diesel Progress plaque for efficient operation. Here in the Green Forest plant, 16-cylinder Cooper-Bessemer engines operate on oil, natural gas or a combination of both.



Exterior and interior of Thumb Electric's prize Caro plant at Ubly, Michigan. Prime movers are these three 8-cylinder Cooper-Bessemer gas-diesel engines.

e the beginning of R. E. A. awards for efficiency.....

er • Bessemer Power

has helped earn "TOP RATED" honors

"MOST EFFICIENTLY OPERATED" . . . since 1951 this Diesel Progress honor has been awarded to R.E.A. internal combustion plants. And also since 1951, this award has been presented to plants equipped with Cooper-Bessemer engines.

This year, two awards and both go to stations powered exclusively by Cooper-Bessemer:

Winner in Division A (plants under 5000 kw capacity)

Thumb Electric Cooperative for the Caro Plant, Ubly, Mich.
2 Cooper-Bessemer LS engines rated 1647 hp at 327 rpm.
1 Cooper-Bessemer LS engine rated 1850 hp at 327 rpm.

Winner in Division B (plants over 5000 kw capacity)

M&A Electric Cooperative for the Green Forest Plant, Poplar Bluff, Missouri.
4 Cooper-Bessemer LSV engines each rated 3300 hp at 327 rpm.

Hundreds of Cooper-Bessemer engines, in all kinds of installations everywhere, are demonstrating the continuous performance at high efficiency that keeps operating costs low! And today, with the latest advancements in supercharging and multi-fueling gas-diesel operation, extreme compactness is combined with unmatched fuel economy for over-all gains never before attained.

For complete information on the very latest in heavy-duty Diesel, gas-diesel and gas engine design . . . 500 to 5450 hp . . . contact the nearest Cooper-Bessemer office.

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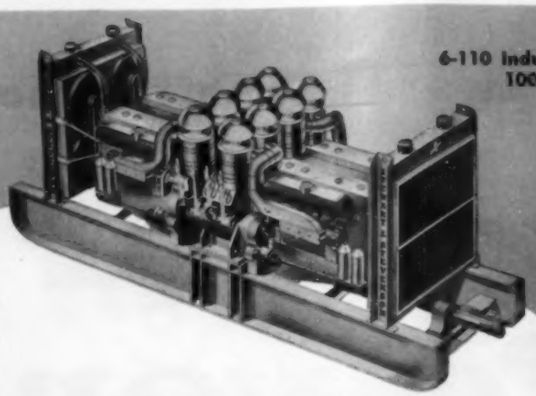
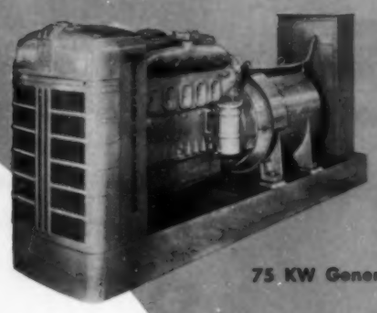
UNITIZED POWER

FOR EVERY INDUSTRY



6-110 Industrial Quad
1000 HP



75 KW Generator Set

PARTS • SERVICE

STEWART & STEVENSON SERVICES

ANYTIME • ANYWHERE

Portable Pumping Units

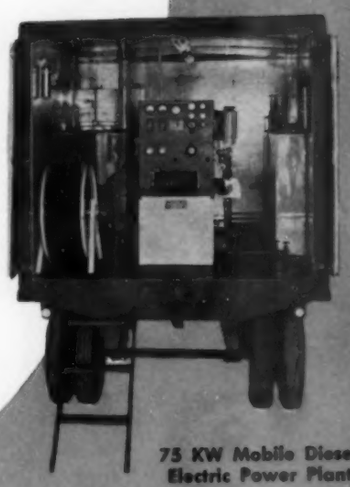
Whatever your power needs, whatever the application, Stewart & Stevenson can help you if you have a power problem.

COMPLETE FACILITIES ALL UNDER ONE ROOF:

- Engineering
- Design and layout
- Complete installations
- Parts and service

FOR FULL INFORMATION, PHONE, WRITE OR WIRE . . .

All units can be furnished with either diesel engines or gas, gasoline or butane engines.



75 KW Mobile Diesel Electric Power Plant

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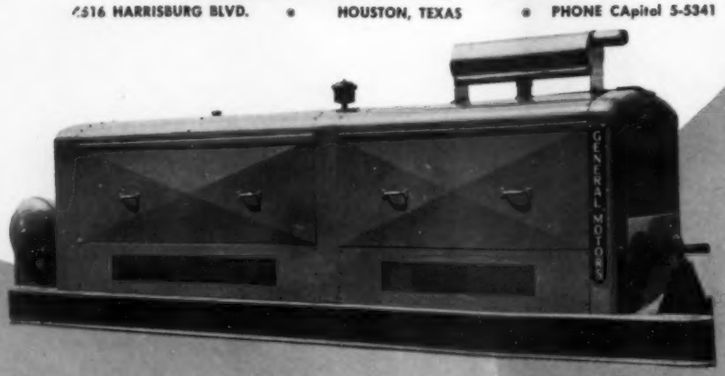


Combination Oil Field Rig Lighting, Welding and Auxiliary Unit

THE WORLD'S LARGEST DISTRIBUTOR OF GM DIESEL ENGINES

Neodesha packs 1-2 performance punch

1 | *Nordberg Diesels* 2 | *STANODIESEL Oil M*

Operator J. N. Finkinbinder (left) and Everett Powell, Neodesha Superintendent of Electric and Water Plants, adjust rocker arm assembly of Nordberg Dualfuel Engine. Engine operated 40,431 hours before overhaul, carrying about 90% of load. All engines in service at Neodesha are Nordberg's. All use Standard Oil's STANODIESEL Oil M.

Finkinbinder and Powell inspect oil filter used for filtering STANODIESEL Oil M used in all six Nordberg Diesels at Neodesha, Kansas, power station.

Quick facts about STANODIESEL OIL M

- Keeps crankcase, pistons, cylinder walls clean.
- Combats deposit and wear problems imposed by using economy fuels.
- Maintains film on difficult to lubricate parts.
- Eliminates spark plug fouling in spark-ignited gas engines and reduces combustion chamber ash and deposits in engines burning natural gas, LPG and liquid fuels.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil mix.

The city of Neodesha, Kansas, has six Nordberg engines in service. They have operated more than 400,000 hours on Standard Oil diesel lubricating oils. Here is the case story of one of these engines. The performance of this engine is typical.

In 1952, the city of Neodesha installed a 1,750 hp., 1230 kw., Nordberg Dualfuel engine. During the period between February 14, 1952, when the engine went into service, and March 1, 1956, the engine ran 34,370 hours out of a possible 35,784. This is 96% of the engine's total installed hours. In this time, not even a piston or cylinder head was removed. So good was the performance of this engine using STANDARD HD Oil that when Standard introduced an improved diesel oil—STANODIESEL Oil M—in February, 1955, this engine was converted to this new oil.

There is more to the story. The engine continued in service to 36,223 hours when No. 7 cylinder liner was pulled to put rubber gaskets on liner to stop water leakage. At this time, No. 7 piston and liner were checked. Liner wear averaged only 0.0045 inches. The top ring showed an average wear of 0.016 inches. The No. 2 ring was 0.020 inches. Little, if any, wear was indicated on other rings. Now, at 40,431 hours, the engine is down for overhaul of turbocharger and to have valves ground. Bearings were found in excellent condition. No pistons are to be pulled.

Get more facts about STANODIESEL Oil M by calling the Standard Oil office near you in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY
(Indiana)

CH-2276

Mining (Rock & Gravel) . . . Caterpillar D7 Tractor
Roadbuilding . . . Caterpillar DW21 and D8 Tractors
Grading . . . Adams "550" Grader
Construction . . . Caterpillar D8 Tractor
Excavating . . . Marion 111 Shovel
Arch Logging . . . Caterpillar D8 Tractor

they've all got this in common...

protection from dirt with Purolator filters

Filtration For Every Known Fluid

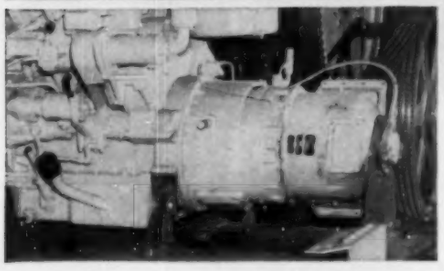
PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada
Agents in principal cities.

When several manufacturers install the same line of filters on a wide variety of equipment, there must be a good reason. For all the equipment shown above the reason is simply this: Purolator filters remove more dirt. That's all there is to it. In terms of engine wear, performance, and long life, this can mean the difference between dependable operation and breakdown. That's why more and more manufacturers of equipment which must operate in dirt and dust insist on the extra percentage of protection given by Purolator filters. Purolator's complete line for construction equipment includes filters for air, fuel, lubrication oils, and hydraulic systems; plus a complete line of screens and strainers.

Equipped with a Twin Disc Torque Converter, this 2½-yd. Lorain L-85 Shovel is working on heavy highway grading near New Stanton, Pennsylvania, for Lycoming Construction Co., Williamsport.



Inset (left) is a Cat D337 Diesel Engine-Twin Disc Torque Converter combination which is available in the Lorain L-85.

How torque converters *assure* higher dividends from your major equipment investments

Twin Disc Torque Converters, dependably and efficiently transmitting power to your heavy-duty machinery, *assure you a higher return* on your equipment investment, through *more work done in less time* . . . with a *minimum of maintenance and costly downtime.*

Here are five profitable, proved reasons why Twin Disc Torque Converters help you to earn *more* from your other equipment investments . . . such as the Lorain L-85 Shovel pictured above.

1. The torque converter eliminates lugging and stalling . . . permitting engines to work in the maximum efficiency range *all* the time, delivering *constant* high-horsepower output—getting more work done.

2. Experience has proved that *smooth* converter power reduces peak loads throughout the shovel drive train because fluid within the converter absorbs much of the impact energy resulting from a quick drum speed change . . . thus protecting *both* driving and driven equipment.

3. When necessary, the torque converter smoothly delivers approximately twice normal torque to the drum, which, at slow digging speed, represents an important advantage in power delivered to the dipper.

4. Cable life is extended since no sharp impact loads ever reach cables through the torque converter. Constant line tension is maintained . . . there is no jerking or snapping.

5. An infinite variety of ratios is available to work with, permitting smooth, accurate control of loads and delicate "inching" or "holding" under power.

Specify a torque converter in *your* next new machine, or when you repower. And investigate the advantages of Twin Disc Torque Converters—both single-stage *and* three-stage—for most other heavy-duty applications from 30 to 1000 hp.

For details, request Bulletin 508 and 135-E (single-stage and three-stage respectively.)

TWIN DISC
Torque Converters

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division), Rockford, Illinois

3 dependable products for the diesel industry

DE LAVAL IMO PUMPS

De Laval IMO pumps do a dependable job during long years of service. The reason is IMO design simplicity. De Laval IMO's have only three moving parts—smoothly intermeshing rotors that propel the fluid axially in a steady flow without churning, pocketing or pulsation. There are no reciprocating parts to wear or become noisy. Quiet, compact IMO pumps are excellent for direct-connected, high-speed operation. They can be furnished in capacities to 1,000 gpm and pressures to 1,500 psig.

DE LAVAL HYDRAULIC FAN DRIVES

De Laval Hydraulic Fan Drives for air cooled heat exchangers and cooling towers offer these important advantages. They *save* power since the fan operates at full speed only a portion of the time. They provide *accurate, automatic* control of engine jacket water temperature, and also assure complete operational flexibility. These units stay on the job for years. As shown, both IMO motor and speed reducer are mounted and factory aligned on a single bedplate.

DE LAVAL HIGH PRESSURE TURBOCHARGERS

De Laval turbochargers offer pressure ratios of 3:1 as well as higher compressor and turbine efficiencies than those found in conventional turbocharger systems. Output of heavy duty diesel, gas and dual-fuel engines may be doubled by De Laval turbochargers without increasing thermal loading. Exclusive Monorotor design offers a compact lightweight unit of sturdy construction. De Laval turbochargers are self-adjusting to engine loads, can be used on 4- *and* 2-cycle engines.

You'll find additional data in these De Laval Bulletins. Write for your copies.

DE LAVAL

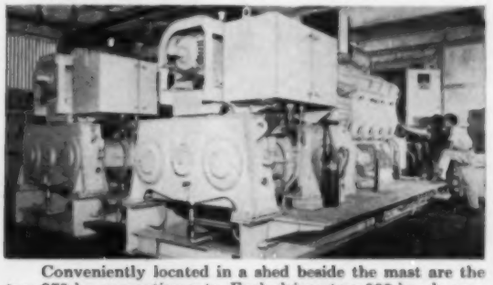
Steam Turbine Company

TRENTON 2, NEW JERSEY

A landlubber goes to sea . . .

Driller's control stand is located beside draw works and just behind rotary table. From this point the driller can oversee every operation. From one panel he has complete control of all Diesel-electric equipment.

Two 875-hp dc drive motors supply power for draw works. Generators are connected to these motors through electric cables, permitting complete flexibility of arrangement. In fact, the entire Diesel-electric system can readily be adapted to any platform.



Conveniently located in a shed beside the mast are the two 975-hp generating sets. Each drives two 500-kw dc generators and comes complete on skids with controls and cooling system. Note how cables to drive motors are neatly routed on overhead trays.

This view from the heliport which tops the crews quarters shows the simple and efficient layout of Rig 34. At left is the driller's stand, at right the engine generator shed. Below deck are pumps and tanks for mud, fuel and water.

BIG CHIEF uses Electro-Motive Power on first offshore rig

Big Chief Drilling Company of Oklahoma City was a landlubber for twenty years before plunging into offshore drilling. More than a year was spent studying offshore problems, designing equipment before launching Rig 34. Why they picked Electro-Motive Diesel-Electric Power is told here:

Deck costs cut to minimum

Platform deck area measures only 88 by 145 feet. Living quarters, fuel storage, mud, water, pipe racks, etc., alone take 88 by 110 feet. In the space left (35x88), Big Chief's engineers had to pack a complete rig and provide for location of six wells. Solution: Electro-Motive Power with flexible cables permitted locating components in a space-saving three story design.

Big power, simple control

Two 875-hp GM Diesel engines driving four 500-kw dc generators supply power to 625-hp drive motors on mud pumps, rotary and draw works. Coupled with this power is a simple and accurate control system that provides smooth and rapid acceleration of loads with positive control of speed and torque. Result: flexible control for faster, lower cost drilling.

Matched components

Electro-Motive Power is a complete drilling power system. Each component was designed and built to work together—one manufacturer—one source of responsibility. The tested dependability and widespread acceptance of this power is proof of its drilling advantages on land or water. For your convenience there's an Electro-Motive Representative located in every major drilling area.

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NORDBERG

MEMO TO: Management
After investigation and full consideration of all facts this committee recommends the installation of Nordberg engines for this pipeline project.

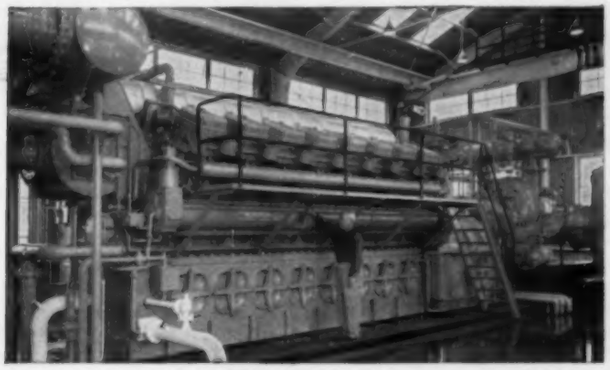
Chairman, Technical Committee

The Scene: Office of the Vice President in Charge of Operations, major gas transmission company.

The Problem: Selection of engine compressor units for gas pipeline expansion.

Recommendation: Install Nordberg *Supairthermal*® gas engine gear sets driving centrifugal gas compressors.

The Reason: Because the Nordberg units can be installed with lower capital investment, and operated at lower cost per horsepower-hour.



Nordberg Supairthermal **Engines are, by all standards, your best investment in modern prime movers for compact, economical, long term pipeline power. These powerful engines are built in both In-line and V-types, in sizes from 500 to 4,500 horsepower for Diesel, Duafuel® or Spark-Ignition Gas operation.**

Consult Nordberg on your next expansion program.

NORDBERG MFG. CO., Milwaukee, Wisconsin

NORDBERG
DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

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O157-R

The new Wooldridge "Cobrahaul" Rear Dump Unit with Fuller 9-speed R-1150 ROADRANGER Transmission.

FULLER R-1150 ROADRANGER® Transmission standard on new Wooldridge "Cobras"!

The Fuller 9-speed R-1150 ROADRANGER Transmission is *standard equipment* in the new Wooldridge 35-ton, 275 hp diesel "Cobrahaul" Dumper and 26-yard 300 hp diesel "Cobra Quad" Scraper. Haul speeds exceed 32 miles an hour on the big 63,400 lb. unit.

Throughout the complete Wooldridge line . . . from the giant 41-yard scrapers down to and including the 7.5-to-10-yard "Cobrette," Fuller Transmissions are standard on Wooldridge Scrapers and hauling units.

Why? Only the most rugged, dependable transmissions can take the terrific shock loads—sudden starts—stops—torque reversals found in all kinds of off-highway operations from solid rock hauling to soggy swamp jobs.

Fuller Transmissions provide maximum ease of shifting ratios for faster acceleration and long life required for these operating conditions.

In Wooldridge's "Cobrahaul" and "Cobra Quad," the Fuller R-1150 ROADRANGER Transmission offers these additional advantages:

- **No gear splitting—9 selective gear ratios evenly and progressively spaced**
- **Easier, quicker shifts—38% steps between ratios**
- **One shift lever controls 9 forward and 1 reverse speeds**
- **Engines work in peak hp range with greater fuel economy**
- **Less driver fatigue—⅓ less shifting**
- **Range shifts pre-selected—automatic and synchronized**

From over 110 models available for rubber-tired equipment, there's a Fuller Transmission designed to do your job.

really **where horsepower goes to work**

Fuller TRANSMISSIONS®

FULLER MANUFACTURING COMPANY (Transmission Division), **KALAMAZOO, MICHIGAN**

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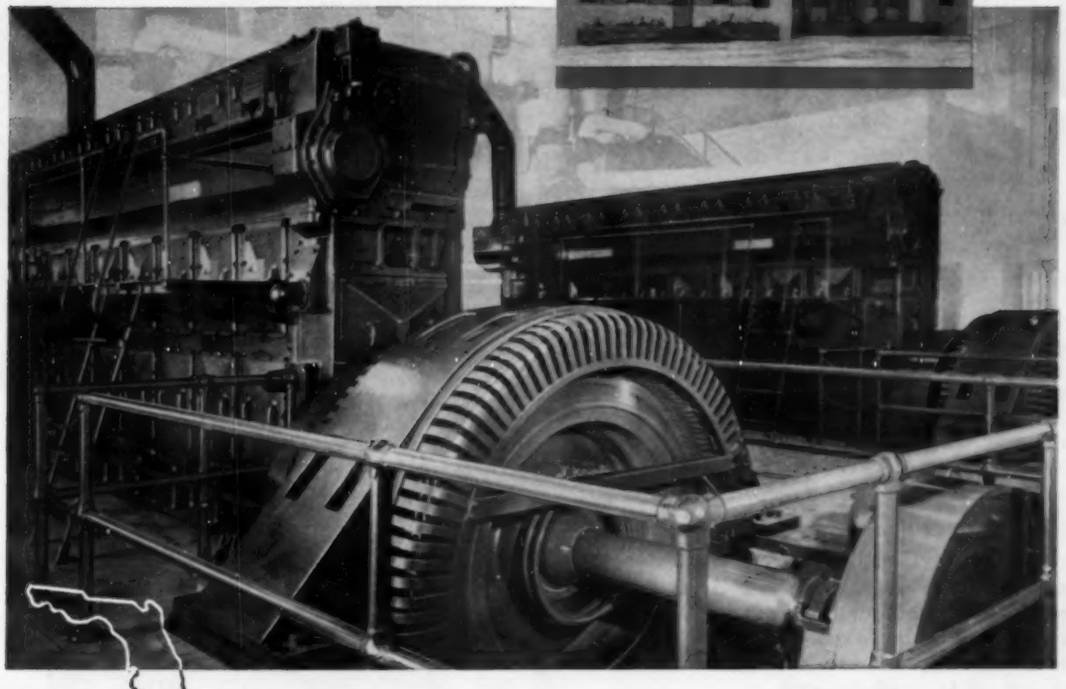
powered by

White's Superior Diesels

on heavy fuel



Marathon power plant saves $25,518 yearly!

True to the Florida town name of "Marathon," two dependable White Superior Model 80 Diesels are winning a real endurance contest at Florida Keys Electric Co-op Plant No. 2. Carrying base load in an area of tremendously increasing local demand, these rugged 8-cylinder 1422 HP supercharged diesels run almost 95% of the time on No. 6 residual fuel. For starting and stopping, No. 2 fuel is used. Saving is $25,518 yearly compared to cost of 100% operation on No. 2 fuel. Each 1000 KW unit is running almost continuously at rated output. In their first full year, they produced 10,638,410 gross KWH at a low fuel cost of 4.699 mills per KWH.

Economical operation on low cost heavy fuel results from Superior's highly developed open chamber combustion system plus special equipment and techniques perfected by White Diesel engineers. Rugged, heavy duty construction and high quality features enable Superiors to operate with minimum maintenance even where mushrooming local demand calls for peak output.

If extreme economy under "marathon" operating conditions interests you, call or write the nearest office listed below. Let White's engineers discuss the many outstanding features of Superior and Atlas engines, ranging from 100 to 2150 HP, for power to 1500 KW.

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Ellwood City Forge meets the most exacting requirements of today's engine builders and operators. Consistent performance, minimum of maintenance requirements and lasting economy can go to work for you, too.

For heavy-duty power needs, make sure your next engine is specified with Ellwood City Forge. Send us your forging problems. Our experts will prove you can have top quality with low cost.

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AS BUYER...

Lynn McMillen sold competitive units six years, but purchases International UD-18A for his crusher

If you've wondered what power unit salesmen would actually buy if they were in the rock products business, here's a clue.

Lynn McMillen, partner in McM Materials, Inc., St. Charles, Mo., states: "I sold competitive power units for six years, but this International UD-18A on our Cedar Rapids crusher is a good engine. We've had no major repairs on it in nearly two years' operation."

That's something to think about, an experienced engine salesman preferring a dependable International diesel when his profits depended upon production. And when you switch to Internationals you can choose from a full line of 16 diesel and carbureted power units—one for every job or driven machine. In addition to bonus-power, you'll get bonus-service from your always-available International Power Unit Distributor or Dealer. Call him soon.

This 125 hp International UD-18A six-cylinder diesel power unit puts a 5-yd truckful of gravel through the Cedar Rapids Junior Tandem Crusher in less than 200 seconds. Ten-yard trucks are filled in six minutes.

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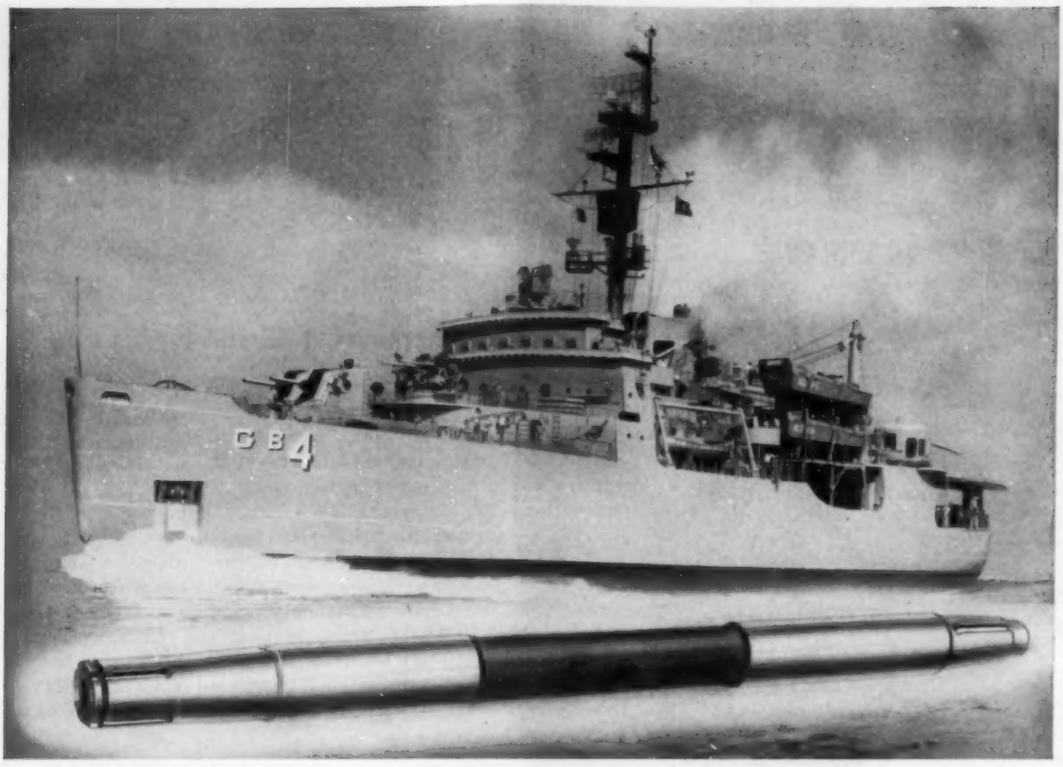

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HORSEPOWER GOES TO SEA —

Another Erie Shaft Drives this Navy Ice Breaker

We use the word "another" because we have produced literally thousands of forged steel components for Diesel and Marine use. From raw material to finished product, under one control and with a single responsibility, forged steel cranks, drive shafts, connecting rods, special forgings for processing equipment and a diversity of steel castings for heavy industry are our daily accomplishment. Isn't it quite logical, then, to place your forged and cast steel components requirements with us? We shall welcome opportunities to consult with you.

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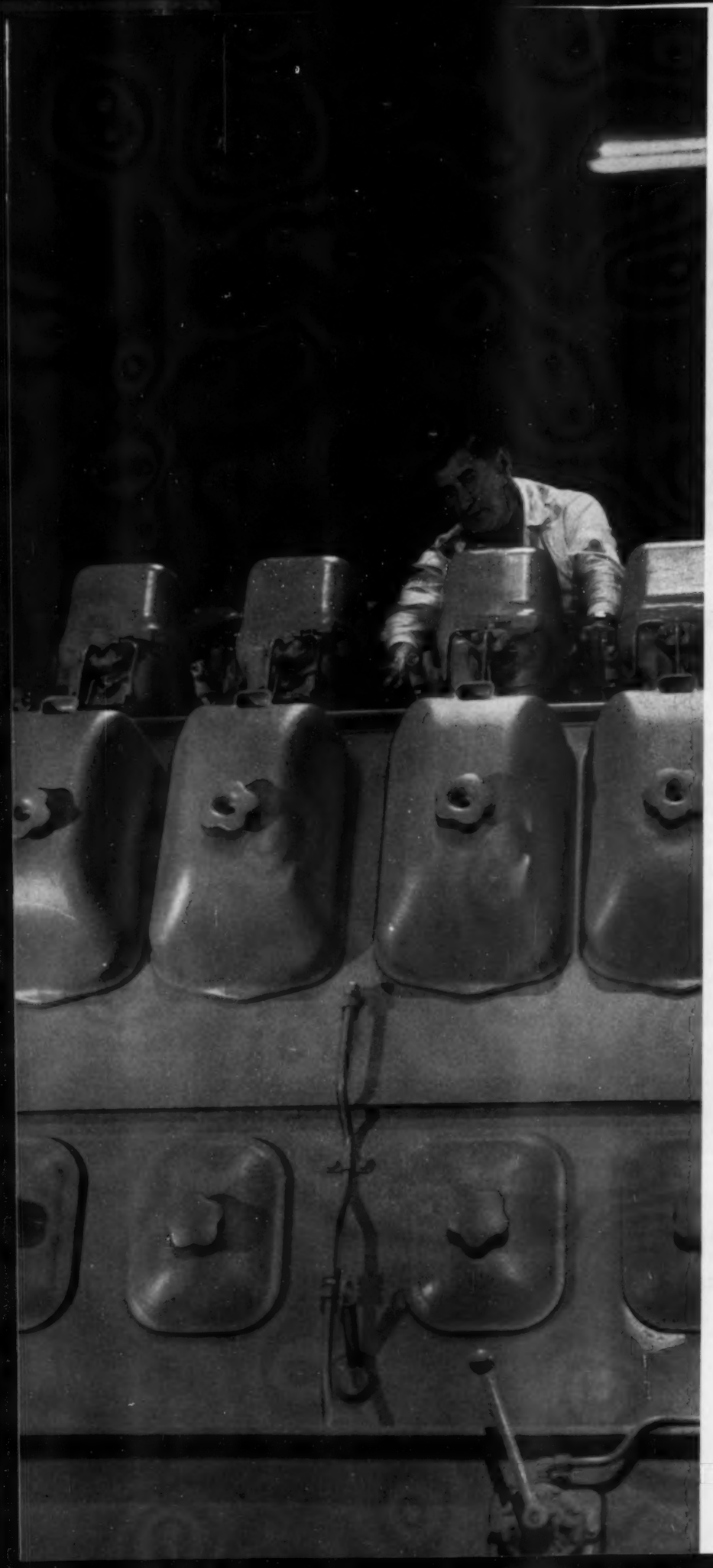

AN ENGINE AS MODERN AS TODAY

The ALCO 251 diesel is modern for good reasons. The first: To save you money. ALCO engineers designed this engine with up-to-date materials, lowering maintenance and slashing weight. Through modern turbocharging and fuel injection they endowed it with more horsepower — reliable horsepower — to drive pumps, compressors, generators, shafts efficiently and economically.

All this means that you can install ALCO engines inexpensively. Heavy costly foundations, grouting, are unnecessary. It means, too, that maintenance costs are lower because modern materials wear longer, and the 251 diesel's design lets your maintenance people get into the engine faster. Replacement parts are readily available from ALCO's six regional warehouses.

ALCO can tell you much more about how the 251 diesel compares to "cast-iron" engines. Contact your nearest ALCO sales offices, or write Transportation Products, Dept. TR-5, P. O. Box 1065, Schenectady 1, N. Y.

Condensed Specifications* for ALCO 251 Diesels

No. Cyl.	Bore and Stroke (in.)	RPM Range	BHP Range	Approx. Wt Dry (lb)
6	9 x 10½	350-1000	550-900	22,100
12	9 x 10½	350-1000	1100-1800	32,650
16	9 x 10½	350-1000	1470-2400	42,000

*DEMA standards

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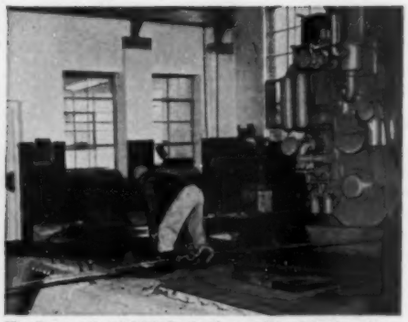


The Enterprise DGSQ Turbocharged Dual Fuel engine is moved into place as a unit. With 16" bore and 20" stroke, it is rated 1422 HP at a speed of only 360 RPM.

Fourth Enterprise Engine arrives at Belleville under protective wraps of all-weather tarpaulin. This new addition adds 1000 KW to plant's capacity.

Bright Power Picture at Belleville: Better Schools and Streets, with Lower Taxes!

"We recently installed the fourth Enterprise Engine in our 100% Enterprise Dual Fuel plant. Our excellent experience with this equipment over the past eight years has proved it to be our best buy in engines. Operating and maintenance costs have been consistently low, greatly reducing power costs and helping make Belleville one of the most thriving and progressive cities in the middle west. We have better schools and streets, lower taxes, above-average recreational facilities, and many other advantages enjoyed by only very few cities of similar size."

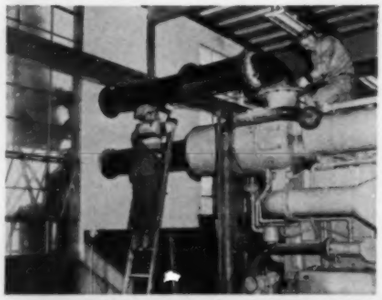
Earl E. Whitney, City Manager
Belleville, Kansas

City managers, municipal engineers, superintendents — all those concerned with the growth, the future, the prosperity of their community, can look to Enterprise Engines confident they will get this same kind of dependable and economical power-generating performance.

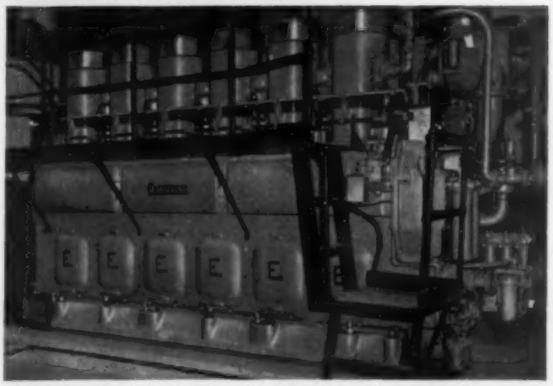
Enterprise Engines — Diesel, Dual Fuel, Spark Ignited Gas — serve every municipal need

The most modern engineering advances are reflected in every Enterprise model, from 73 to 6933 HP, for stationary or portable electric service, flood or water pumping systems, sewage plant power. See the Enterprise sales engineer in your area, or contact us direct for information or help with your plans.

Over a million horsepower at work the world over!



Installation nears completion as exhaust stack and muffler are installed. This "all Enterprise" plant, with its 2500 KW capacity, now has ample dependable reserve power for any emergency, future growth.



New member of the all Enterprise power team is cut in on the line. Low maintenance cost, excellent service record, and over-all economy of the Enterprise engines already in use were the big factors in its selection.

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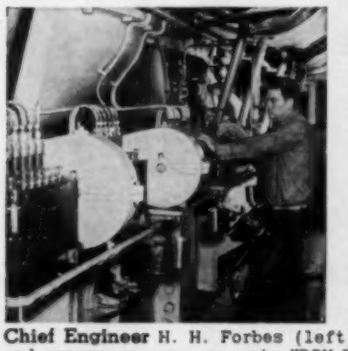
ENGINEER'S FIELD REPORT

LUBRICANT RPM DELO MARINE OIL

FIRM PACIFIC FAR EAST LINES, INC. San Francisco, Calif.

Liner wear only .0012″ per 1000 hrs. with RPM DELO Oil

Giant Cylinder Liner lubricated with RPM DELO Marine Oil showed only a .0372" wear when recently replaced after 31,660 hours operation. That's an average of only .0012" per 1,000 hours! The 32" bore, 95" stroke cylinder liner is one of five such units in the 7,500 bhp Sun-Doxford diesel propulsion engine of Pacific Far East Line's M.V. Sea Serpent. A modified C-2 vessel, ship carries refrigerated cargo between Pacific Coast and Far East. Cruising at 15½ knots, she makes a round trip in six weeks.



Chief Engineer H. H. Forbes (left), checking cylinder-lubricators and scavenger pump, reports "RPM DELO" prevents lacquer formation on cylinder liners. View through crankcase inspection port (right) reveals temporarily disconnected piston, kept bright and shining, free of deposits by RPM DELO Marine Oil. Special detergent in the oil keeps engines clean, helps prevent scuffing, even when heavy residual fuels are used.

Why RPM DELO Marine Oil reduces engine wear

- Oil film stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation—prevents deposits that stick rings
- Compounding inhibits deposits—solves residual fuel problems in low-speed marine diesels—cleans dirty engines, helps prevent scuffing
- Inhibitors prevent bearing corrosion, foaming in wet or dry sump engines.

For More Information about this or any other petroleum product, or the name of your nearest distributor, write or call any company below.

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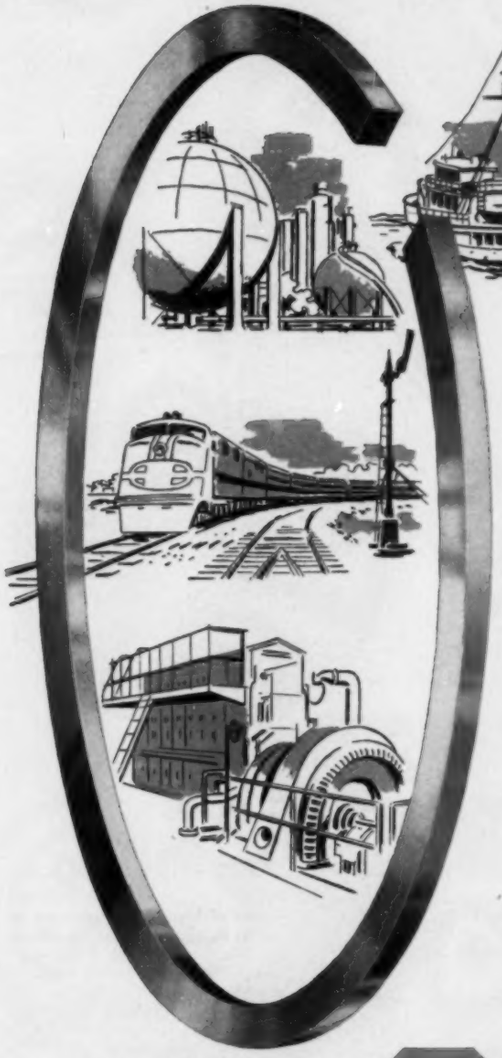
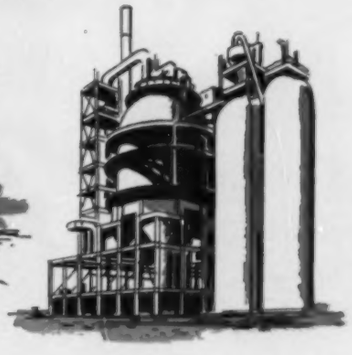
field-tested money savers!





Why not specify piston rings that have *proved* themselves? Koppers rings have been saving money and cutting costs for years—throughout the oil and gas industry, the marine industry, on major railroads, all over the chemical field, throughout the aircraft business, in municipal and industrial power plants everywhere—wherever you find gas, Diesel or steam engines, pumps, compressors, forging hammers—*wherever piston rings are needed!*

They're built to take it . . . designed to cut downtime and maintain high compression . . . give longer, more satisfactory service . . . save you money on fuel and lubricating oil . . . *and that's exactly what they do.* And Koppers rings are available in all types, all sizes—from ½" to 10′ diameter—specifically designed for the job they will do in the field where they will be used.

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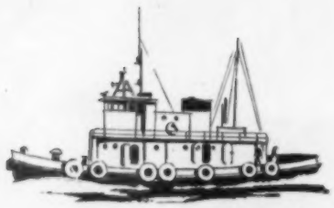
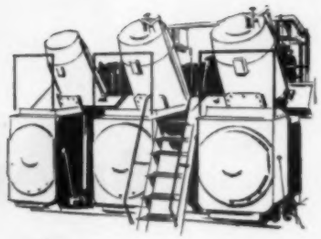
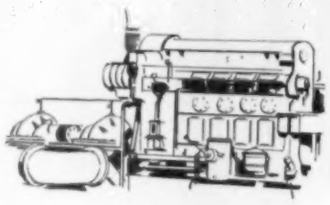


Marine



Engine compressor



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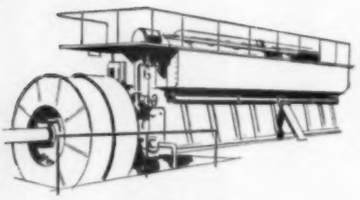

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SALT LAKE DIESEL NAVY—PART II

By F. HAL HIGGINS

INDELIBLE railroad history is being made in Utah by the Southern Pacific which is constructing a $49 million solid dryland roadbed across the Great Salt Lake. Completion in slightly more than three years will remove rail traffic from an existing 12-mile-long wooden trestle, that has served the railroad as a causeway for 52 years, and become part of the 32-mile Lucin Cut-off. For those who like their West with Indians, thundering buffalo herds and road agents holding up mail stages, the gigantic engineering job being done across the Great Salt Lake may seem a bit prosaic. But, this is one of the big engineering feats of a world full of giant construction projects that are harnessing rivers, building power plants and constructing roads and streets to speed traffic.

To the engineering and construction world it is an outstanding project. To the Southern Pacific, it will provide a stable, permanent and indestructible roadbed not subject to possible fire hazards which only recently destroyed part of the old trestle a few months back. Equipment, most of it diesel, to the value of $15,000,000, is in operation on this job. The contractor is one of the top firms of the world with its jobs completed and in operation, dotting the heavy construction world. It is Morrison & Knudsen of Boise, Idaho, with a Los Angeles branch of the firm. The lineup of equipment as given by Morrison & Knudsen is: 8 tugboats: 6 of 1,000 hp, 2 of 600 hp. 2 Hydraulic dredges. 13 barges: 6 bottom dump, 7 flat top. 5 power shovels: 3 Bucyrus-Erie, 2 Northwest. 4 LCVP landing craft. 12 Cat D8 tractors, 16 Euclid trucks, one 5500 gal. water truck.

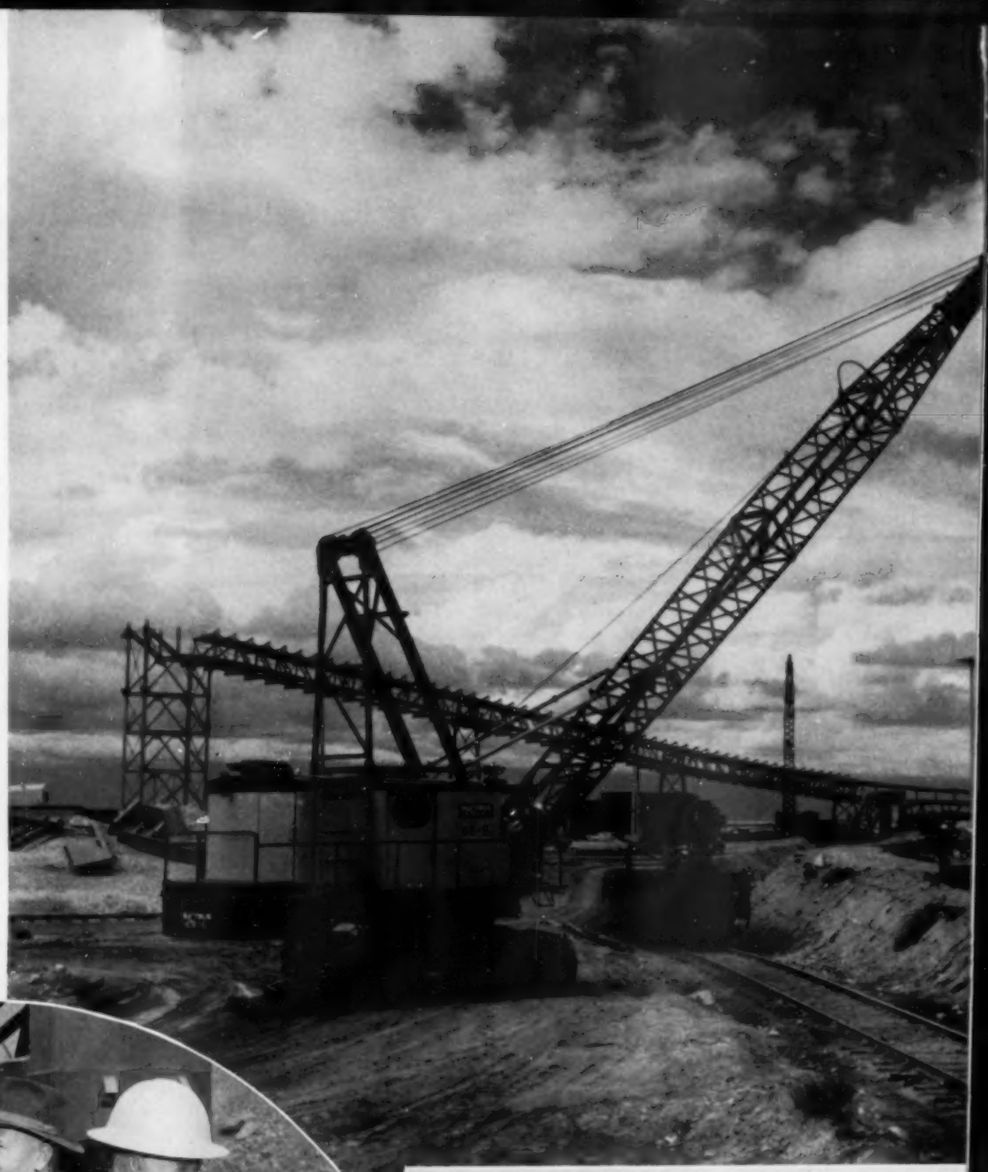
Such a job as this SP fill with its many engineering problems calls for the best in accumulated know-how in the heavy construction field. Southern Pacific handed it to Morrison & Knudsen. This firm, with its world-wide achievements in overcoming terrain, far from its Boise and Los Angeles headquarters, won the bid. The engineering and heavy construction press is giving the Great Salt Lake crossing feature attention. It is a four-year job that started in June, 1955, when SP construction forces dumped rock on the saline fill that extends west from Promontory Point. Morrison & Knudsen got their award in March, 1956, on a $45 million estimated bid. The 13-mile embankment will cost all of the estimated $49 million, since about $4 million will be spent for rails and signal equipment after the fill is completed. Among engineering feats that the M & K forces will accomplish before the project is completed are 16 million yards of dredging as part of the 47 million yards of material that will be handled.

Some 600 men and $15 million in equipment are on the job as "tools of the trade." The world wide operations of M & K—and their managerial ability to equip and re-equip their skilled labor with the latest machines to cut costs in time and men is one of the wonders of the modern engineering world that makes every job they do a laboratory for engineers and contractors in the heavy construction field. As a sample of their use of diesels in this world leadership, Mr. Paul Nations of M & K gave the writer this summary of the firm's $35,000,000 in equipment that includes airplanes and Monighan draglines: 299 diesel crawler tractors from D6's to D9's, 170 prime mover scrapers, 42 diesel generators, 62 diesel motor graders, 98 diesel excavators, 8 diesel drills, 68 Compressors from 315 cfm to 900 cfm, 187 diesel trucks.

Shoreward bound from the area where Southern Pacific is building a dry-land fill across the Great Salt Lake is the Tugboat *Utah*, with Enterprise diesels, pushing the huge barge, *Brigham City*. The loaded barges weigh in excess of 4100 tons and will haul 19 million yards of gravel, 12 million yards of quarry-run rock and more than one million yards of select rip-rap when the project is completed in 1960.

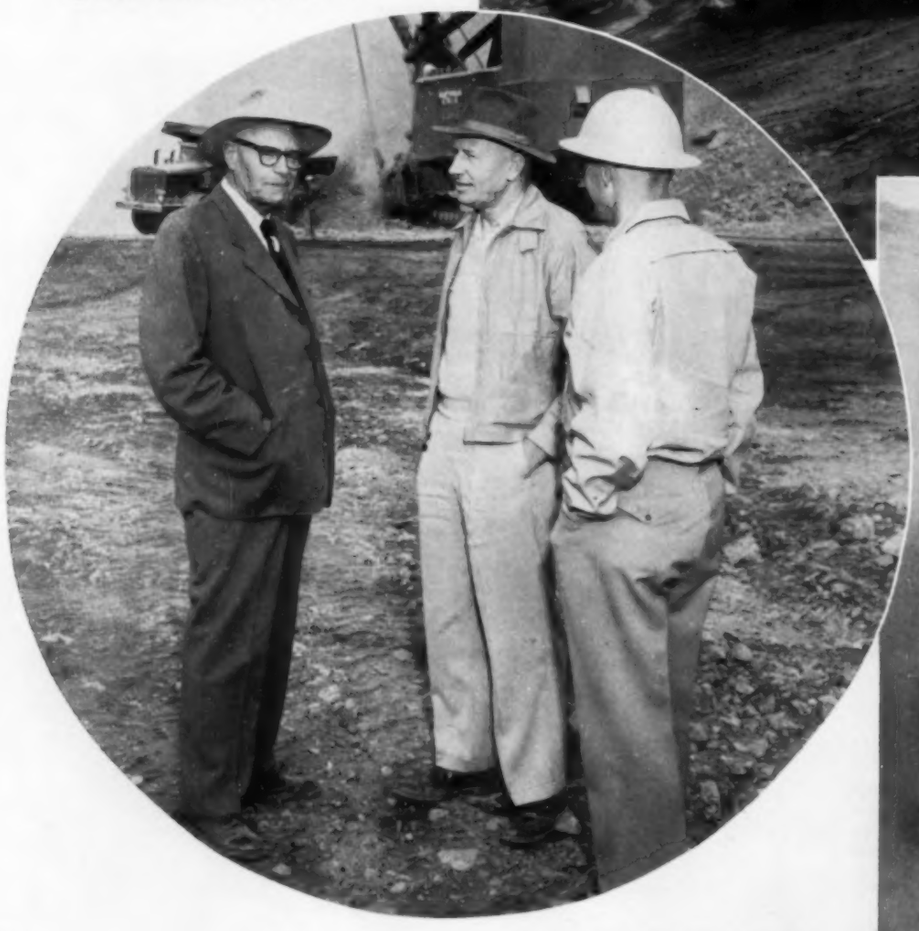
This equipment is scattered over the map where M & K is working in South America, the Far East, Canada, Mexico and the U.S. Managerial field force on the job for the various interests: H. J. Willard, construction division engineer of Southern Pacific Company; Harold Anderson, resident engineer for International Engineering Co. in the preliminary work, will be replaced by Norman Rand for the remainder of the job. Oirind Moe is project engineer for International. Morrison-Knudsen has O'Dean Anderson there as project manager with Carl Larson as general superintendent and Denny Bagley as project engineer. Chicago Bridge & Iron Co. has Orin Smith as superintendent. C. L. Tudor is managing engineer for Hewitt-Robins on the installation of belt and conveyor.

The scale of operations in the early stages of the fill were dramatized when one recent blast shattered a cliff near Little Valley with 900,000 pounds of explosives. About a million tons of rock were loosened and crumpled so that the huge diesel shovels could load the trucks that carry rock to the barges and transportation to the fill site. This was the second largest non-atomic explosion ever



88B Bucyrus-Erie doing crane job at the barge harbor on edge of Great Salt Lake. Cummins engine.

Mr. Heavy Construction—H. W. Morrison, President of "M-K" drops in on the Salt Lake job from tour of his world of heavy construction. Vice-President L. B. Wilbur and Project Mgr. Dean Anderson with their chief.



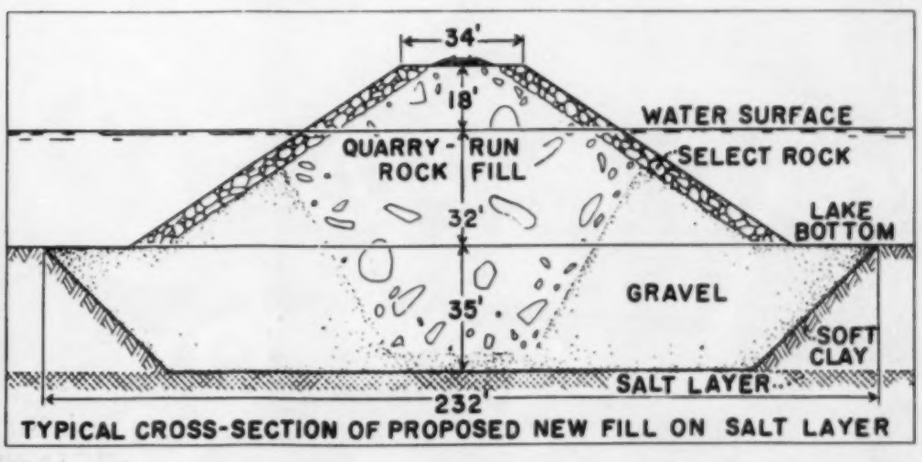
Cat D8—one of 12 on job moving rocks after blasting on Morrison-Knudsen's Great Salt Lake fill for Southern Pacific Railroad. One of the big blasts knocked off and broke up a million tons of limestone—third biggest shot in United States non-nuclear history.

detonated, according to W. M. Jaekle, chief engineer for Southern Pacific. Scientific instruments were set up to measure speed and intensity of shock waves as clues to the thickness of the earth's crust. Science and the SP were served in one shot.

The dredging of the lake bottom will form a trench 175 to 480 feet wide and 20 to 35 feet deep to reach through the soft mud to stronger clays or salt layers. The bottom of the trench will be a maximum of about 70 feet below the water surface. Rock and gravel will then be dumped into this trench to give a solid foundation for the fill that will carry the railroad when complete. The barges will dump the material from both ends to a height of 10 feet below the water surface. The remainder of the fill will be completed by dragline and dump trucks. When the embankment reaches 18 feet above lake surface it will be widened and strengthened by heavy rock as protection against lake storms that often toss up waves as high as eight feet to batter the shores.

Kaiser's steel fabricating plant at Napa, California, built the giant diesel barges that are used on the fill. These were dismantled and shipped via SP trains in 32, 10 to 30-ton sections to the launching site for reassembly. A conveyor system, costing over $1,700,000, is one other feature for moving gravel. This is a Hewitt-Robins system that has a self-generating power system for nearly two miles of belt. SP can be proud of its long leadership in transportation that goes back to the pioneer days of its main root, the Central Pacific, and its golden spike that was driven near this latest herculean job that will be a faster and safer main artery between East and West in peace and war.

Bucyrus-Erie electric shovel loading Euclid (GM engine) for haul to fill across Great Salt Lake.



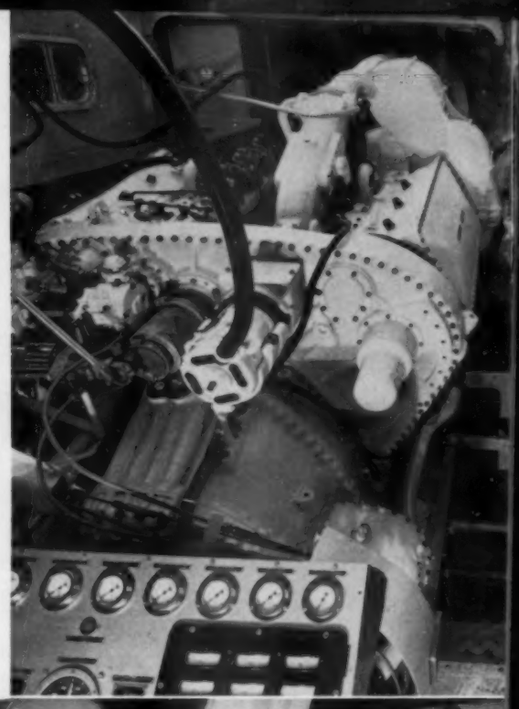
TYPICAL CROSS-SECTION OF PROPOSED NEW FILL ON SALT LAYER

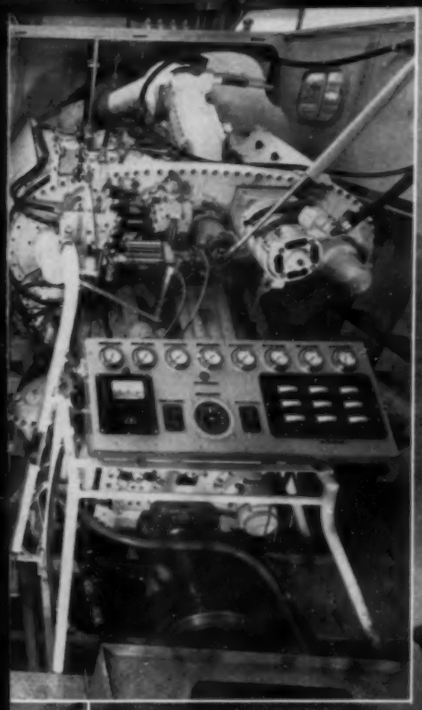
THIRTY KNOT PERSONNEL BOAT

Arnold B. Newell Describes A British-Built Superfast Passenger Craft For Venezuela's Offshore Drilling As First Deltic-Powered Commercial Vessel.

THE first of three fast passenger vessels, each powered by two Napier Deltic diesel engines, recently completed successful trials at Southhampton, England, showing a mean speed of 31.2 knots. This is the first time the Napier Deltic diesel has been put to commercial use, previous installations having been in naval vessels on the Admiralty top secret list. These launches, built for Cia. Shell de Venezuela, will operate on Lake Maracaibo where Shell is conducting large scale marine drilling operations extending some 40 miles offshore.

Engineers, technicians and drilling staff working on the drilling rigs in the lake must be transported by water to the scene of operations. The men have to spend a considerable time travelling to and from work and it is most desirable that this time be minimized. The new boats will transport up to 45 passengers at a speed of over 30 knots, and are much faster than any other craft now in use for this purpose. Designed and constructed at Southhampton by John I. Thornycroft & Co. Ltd., who have built a large number of personnel boats, these





vessels, which set a new standard for fast commercial craft are 68 ft 3 in. in length, 17 ft 5 in. wide, 9 ft 4 in. moulded depth and draw approximately 5 ft 6 in. of water. Each engine is fitted with a combined reverse and reduction gear driving a separate screw at a shaft speed of 712 rpm. The gears are capable of absorbing 865 shp in temperate latitudes but are rated 810 shp for Maracaibo conditions.

Besides the six engines for the three vessels, spare engines will be held at a lake-side depot for a quick engine change when a routine overhaul becomes necessary. Therefore no boat need be out of service more than a few hours and continuous ferry service between shore and drill rigs is assured. The vessels with a raked stem and transom stern are built of steel because damage may be caused by floating driftwood, of which there is a considerable amount on the lake, up to fairly large size some of which is almost completely water logged. Steel construction is preferred to wood because of the better facilities for quick repairs on the spot.

A special feature of this vessel is the positioning of the wheelhouse, well forward in the best possible position for the lookout to spot floating driftwood. An unobstructed all-round view facilitates maneuvers. A Mathway steering gear operates twin rudders. The engines are controlled from the wheelhouse by Teleflex control gear. A Teddington push button control panel provides automatic starting and enables the helmsman to start and control the engine. Propeller speed is 712 rpm. A 24-volt storage battery supplies power for electrical equipment on the Deltic engines and for general services. It is charged by two 720 watt CAV generators one on each main engine. The boat has three exhaust fans, three clear view screens, two searchlights, one headlight and navigation and inside lighting.

The Deltic diesel installation comprises two 9-cylinder Napier Deltic water-cooled, opposed-piston 2-cycle diesels, each rated at 865 shp but operating at 812 shp in the prevailing Venezuelan climatic conditions. The basic structure is formed by three cylinder blocks assembled with three crankcases to form an inverted triangle held together by long high-tensil through-bolts carrying the combustion load. The output from the three crankshafts is combined in a phasing gear casing bolted to the driving ends of the crankcases. The ahead and-astern reduction gearbox is bolted to the phasing gear casing thus forming an integral engine unit. A power take-off shaft and drives for the scavenge blower and various auxiliaries are provided by the phasing gearing. The centrifugal scavenge blower at the free end of the engine is driven from the phasing gearing by a torsionally flexible shaft running through the cylinder block. The three blower outlets each communicate with a separate induction trunk that serves a complete bank of cylinders.

Engine speed over the entire range is controlled by a Napier hydraulic governor. Complete engine control and ahead-astern gear selection are effected by a single master lever except for starting and stopping when an override lever is used. These two levers and starting switch are installed at the steering station in wheelhouse.

For quick warm up and even temperatures over the engine running range, thermostatically controlled by-pass valves are included in the lubricating oil and coolant systems. An air intake silencer of the return flow type draws its air from the engine room space via paths lined with sound absorbent material.

To assist the intake of the circulating water internal scoops are fitted to the hull. The engine-driven circulating pumps draw water through the scoops, valves and strainers, pass it through heat exchangers and discharge it overboard. Circulating water is discharged into the exhaust system and to the stern tubes for lubrication of the Cutless bearings. Dry exhaust gases manifolds travel via flexible steel exhaust pipes and bends and light weight Burgess Silencers, to the shipside.

U.S. NAVY'S PORTABLE POWER PLANT

Complete 675 Kilowatt Generating Station With Opposed-Piston Diesel Meets Size And Weight Limits For Highway Travel.

THE world's most powerful trailer-mounted diesel generating plant has been built by Fairbanks, Morse & Co. Rated at 675 kilowatts for continuous, heavy-duty service, this complete, self-sufficient plant meets size and weight requirements for over-the-highway movement. It produces a third more power than the largest previous over-the-road generator. First of the new mobile power stations was delivered to the Navy's Bureau of Yards & Docks, providing an emergency power source for established yards and bases and an immediate power supply for any construction site or isolated installation in the world. Fairbanks-Morse officials envision broad use of these power-laden semi-trailers by utility companies for emergency or maintenance work, by contractors in large construction projects, by general industry for temporary service or emergency standby, and by states and municipalities for civil defense.

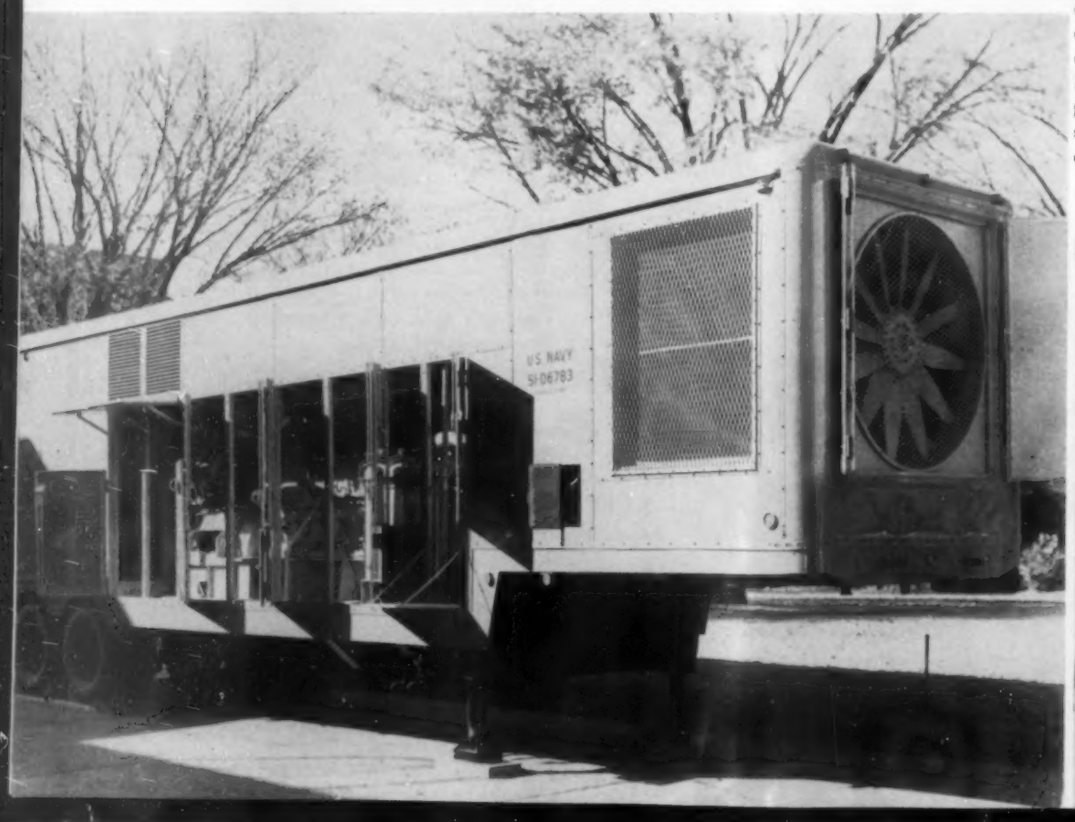
The plant built for the Navy measures 36 ft 2 in. in length, 8 ft in width and 12 ft 6 in. in height and weighs just 72,000 pounds, less than 107 pounds per kilowatt of capacity. Yet this includes a six cylinder Model 38D8-⅛ opposed-piston diesel rated at 962 horsepower at 720 rpm, generator, switch-gear and control equipment, complete cooling, lubricating and fuel systems, starting air compressor and auxiliary engine. The semi-trailer even includes a 450-gallon fuel tank, sufficient to run the diesel at full load for 9 hours. Thus, when a highway tractor hauls the trailer to the spot where power is needed, it can start delivering 675 kilowatts immediately after it is hooked to the distribution line. Two or more units could function as an integrated plant, quickly providing any required power supply. It is possible to wrap up so much power in so small and light a package because of the compactness and light weight of the Fairbanks-Morse opposed-piston engine, long used by the Navy in submarines and ice breakers and by civilians for work boats, locomotives and stationary power plants.

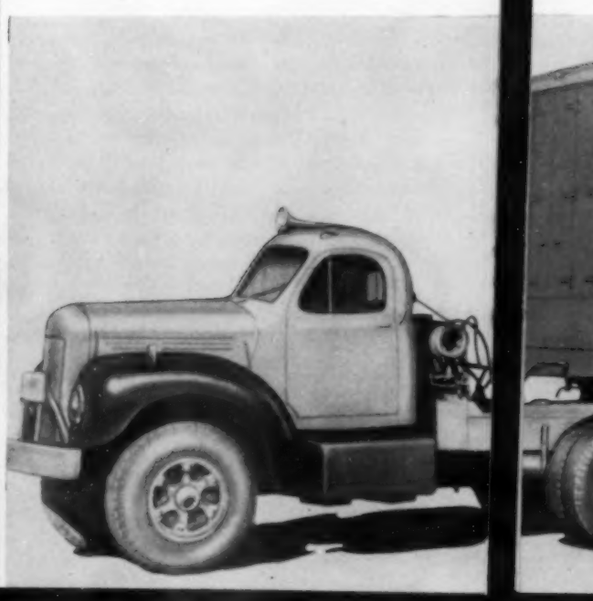
In addition to the 675 kilowatt plant, Fairbanks-Morse has announced three smaller trailer-mounted generating stations, rated at 350 kw, 400 kw, and 500 kw. These power plants incorporate the smaller version of the opposed-piston diesel, a unit with 5¼ in. bore and 7¼ in. stroke. The three smaller mobile stations are 32 ft 7 in. long, 8 ft wide and 11 ft 10 in. high. The 500 kw unit with its 750 hp, 10-cylinder diesel weighs just 51,500 pounds; the 400 kw plant with its 600 hp, 8-cyl. engine weights 47,500 pounds; and the 350 kw unit with a 525 hp, 7-cyl. diesel weights 45,100 pounds. Figures given are dry weights, but addition of fuel, lube and cooling water still leaves the plants well below highway load limits. Using just the built-in fuel supply, these diesels can run at full load for 12.2 hours, 14.2 hours or 16.1 hours respectively.

Despite the space limitations, all four mobile plants incorporate heavy-duty engines and complete, standard accessory equipment. Scavenging air blower, lube oil pump and cooling water pump all are mounted on the two-cycle diesel. Key equipment in the cooling system is a pair of radiators cooled by a motor-driven fan. The engine-driven pump circulates coolant through the oil cooler, engine jacket and radiator. There are thermostatic valves in both water and lube circuits. A full complement of filters protects the engine. Scavenging air is cleaned by oil-bath filters. The lube circuit includes both a full-flow strainer and a cartridge-type by-pass filter. Fuel is filtered before the header that feeds the injectors. The engine also has the protection of alarms on high water temperature and low lube pressure with either automatic or manual shutdown as desired. Engine operation is controlled by a hydraulic governor. To make the mobile plant a desirable neighbor, exhaust gases are passed through snubbers.

Starting air for the diesel is provided by a motor-driven compressor and stored in tanks with enough capacity for three starts. A 6 kilowatt diesel-generator set supplies energy for the compressor, lighting and other auxiliaries when the main engine is shut down. The small generator set is started by a 24-volt battery. The main engine drives a dual voltage 2400/4160 volt, three phase,

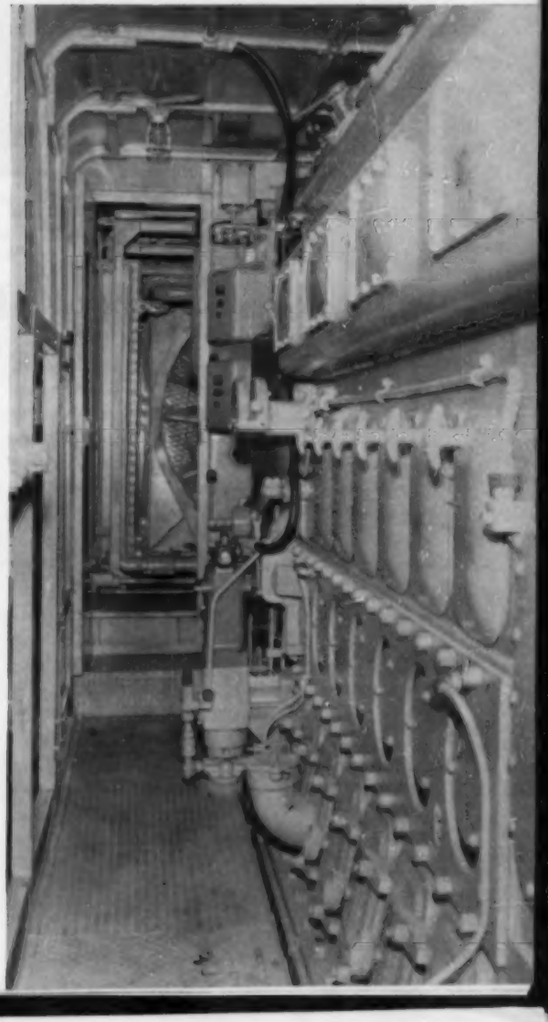
Supported solidly on its jacks, the Navy's new Fairbands-Morse mobile diesel plant is ready to deliver 675 kilowatts. The F-M opposed-piston diesel can be seen through the open doors of the engine compartment, with the engine cooling compartment at right and the control compartment at left.





60 cycle generator with exciter mounted on top the generator frame. A switchgear equipment enclosure provides space for mounting equipment to meet customer requirements and there also is space for conductor links for wye or delta connection, line disconnect switches, and transformers to step down voltage for the fan motor, lighting and auxiliary equipment. A protected terminal board on the back of the switchgear enclosure makes it easy to connect to a distribution line brought through either of two small doors on both sides of the trailer body near the roof line. The trailer has a sturdy steel underframe to support the equipment and an aluminum body divided by bulkheads into an engine cooling compartment, an engine compartment, and a control compartment. Slide doors are provided for easy access and routine maintenance. For major overhaul, the entire aluminum body can be lifted off as a unit. The U. S. Navy's Bureau of Yards and Docks initial order was for two of the 675 kilowatt plants. Fairbanks-Morse feels that the advantages of this type of generating facility will certainly recommend it for many other applications both in the government and industry.

Fairbanks-Morse formally turns over to the U. S. Navy's Bureau of Yards and Docks the world's most powerful mobile diesel plant trailer-mounted for unlimited highway travel. Left to right are: William B. Morse of Fairbanks, Morse & Co., N. R. Fortier and Capt. B. A. Strauss representing the Navy, and Fairbanks-Morse Coordinator of Government Business F. M. Mason.



Power for the mobile plant is provided by this 962-hp. heavy-duty Fairbanks-Morse opposed-piston diesel. Use of this compact, lightweight engine made it possible to build a complete 675-kw. power plant weighing less than 107 pounds per kilowatt.

All buttoned up and ready to roll, this new Fairbanks-Morse mobile power plant has a capacity of 675 kilowatts, making it one of the world's most powerful trailer-mounted diesel generating station.

From left to right:- Howard Clutts, Superintendent, then James W. Owens, Jr. Manager, both of M. & A. Electric Power Cooperative of Poplar Bluff, Mo. Then your editor Rex W. Wadman looking up at Don H. Decker, Superintendent standing next to Orville Hurford, Manager, both of the Thumb Electric Cooperative, Ubly, Mich.

DIESEL PROGRESS PRESENTS REA PLAQUES

The eighth annual conference of the Rural Electric Generating Cooperatives was held this year at the Phillips Hotel in Kansas City, Mo. It was well attended, the program interesting, an altogether well worth while meeting. An opportunity was given me to break into the program Monday morning April 8th to make the formal presentation of the DIESEL PROGRESS REA annual awards to winners of the Class "A" and "B" classifications.

Full details of these awards and the winners appear on pages 44 through 50 of this issue. In my brief talk I brought out the reasons behind the starting of the contest back in 1951. It was of course to encourage the individual REA Cooperatives using diesel and/or gas (natural) engines to improve their operations, reduce costs of producing power to the switchboard and generally step up their over-all efficiency. The effectiveness of the contest is shown by this table:-

		Rate
1951	Ariz. 20 PIMA won	7.27 mills
1952	Mich. 46 HERSEY won	6.85 mills
1953	Mich. 46 HERSEY won again	6.48 mills
1954	Mo. 60 POPLAR BLUFF won	6.16 mills
1955	Mich. 46 HERSEY won	5.47 mills
1956	Mo. 60 POPLAR BLUFF won	5.09 mills

All figures are based on net mills/per kwh after fuel evaluation whereby all plants contesting, in submitting their fuel consumption, also gave the BTU content of same, whether oil or natural gas. The reason for this requirement is rather obvious. Fuel costs vary tremendously from one plant to another, yet fuel costs do not enter into operating efficiency, which is what we wanted to find out—the plants producing the lowest net cost at the switchboard. So we set the formula at 40¢ per million BTU regardless of what each contestant actually paid for their fuel. This plan has worked very well now for six years.

On pages 44 through 50 of this issue you will find we split the contest last year into two parts; one for plants of 5000 kw and under and the other for plants with a capacity of 5000 kw and over. The Class "A" or 5000 kw and under division was won by the Caro, Michigan plant of the Thumb Electric Cooperative of Ubly, Mich. with a nice rate of 6.29 mills/net kwh. The tall guy in the picture above is Don Decker the Superintendent and standing next to him is Orville Hurford the Manager of Thumb Electric Cooperative. The two handsome young fellows on my right—Jim Owens and Supt. Clutts of Poplar Bluff, are old friends of mine—they won the plaque in 1954 and came back to win it for 1956. The new boss of the Internal Combustion Plants Section Electric Engineering Division of the REA—William H. Reed, attended this meeting, many of us met him for the first time. Good luck to you Mr. Reed—we like you.

THE USE OF FUEL ADDITIVES IN DIESEL ENGINES

An Analysis of Fuel Additives and Their Importance With A Detailed Description of Dupont's Diesel Fuel Additives Family.

By ARNOLD B. NEWELL

SOLUTIONS to the problems associated with use of lower priced fuel in locomotive diesels have been slow in coming but with the progress made to date the greater economy of diesel operation resulting therefrom will be far reaching indeed. Obviously the railroads have more at stake than any other general group of diesel owners and at the same time there are many characteristics of the locomotive diesel that are similar even though the makes are different. These similarities include operating speed, methods of fuel injection in general and the methods of operation dictated by the class of service. Since diesels of types produced for locomotives are used in boats, off-shore drilling rigs, industrial power generation, municipal power plants and several lesser fields, the gains made in fuel economy will undoubtedly be taken advantage of in other fields.

There are two approaches to the successful use of cheaper fuels in diesels. Without regard to the variations in chemical composition of the petroleum use, thorough cleansing to remove impurities in the form of solids, and especially abrasives must be done in some way, thru the use of centrifuges or filters, or both, but once this is done the entire problem is not solved because such processing does not correct a condition of instability which manifests itself in the form of large agglomerates known to be troublesome. Because of this manifestation and numerous other fuel characteristics it is apparent that the use of a stabilizing additive is necessary. That the additive should be produced by a company large enough and rich enough not to be pressured into the market for economic reasons is very evident. We therefore have reason to look with favor upon the work along these lines by Du Pont whose reputation for withholding from the market all products not fully developed is traditional. I shall therefore draw upon the work of this company as reported by Mr. W. T. Robinson of E. I. du Pont de Nemours & Company throughout the article.

As a British friend has pointed out, "the additive business is tricky". Although my friend has made a correct generalization, the fact remains that technologists of the major oil companies and the chief engineers of large diesel manufacturers accept the fact that a fuel oil additive produces beneficial results from both the technical and the commercial viewpoint. None the less the claims made by some producers of additives vary from the ridiculous to the extravagant and for this reason the medicine man stigma has all too frequently been applied to additives in general. This is of course unfortunate and it has made the problem of the reputable manufacturer quite difficult.

Complexity of the situation is revealed in the formation of water with complete combustion of fuel, oxides of carbon, nitrogen and vanadium with some fuels. In the presence of water these oxides form harmful acids when temperatures fall below the dew point and this is likely to occur more frequently in engines with varying loads and idling periods as in locomotives. Since combustion is seldom complete and incomplete combustion results in carbon formation, asphaltines and complex organic compounds including peroxides, aldehydes, keytones, carboxylic acids and others which in toto are lumped under the general heading of carbon, we find that incomplete combustion poses its problems. However, these problems must far exceed in cost the use of corrective measures before such measures can be justified commercially.

The major incentive to use low cost fuel is to reduce operating costs through fuel economy; for as Robinson points out it was simple mathematics for a railroad using 150,000,000 gal. of diesel fuel per year to see that a saving of 1 cent per gallon would make the company $1,500,000. Diesel fuel represents over half of the operating cost of a diesel-electric locomotive. At one time considerable trust was placed in the use of an additive lubricant for its neutralizing action on the after effects of incomplete combustion, but it later developed that this was putting the cart before the horse because the more difficult the combustion problem became, the more rapid was the lube oil additive depletion. The stabilizing influence of an effective fuel additive on the other hand improves combustion and removes some of the responsibility placed upon the detergent lube oil in the engine.

Use of the fuel additive should produce two-fold economy. Its tendency to fuel stabilization aids in the use of lower cost fuels and through improved combustion the periods between engine overhaul are considerably extended, while the rate of wear in general is materially reduced. While granting that we are delving into a subject as deep as it is complex, Du Pont has a way of solving complex problems and their findings as expressed by W. T. Robinson are therefore both interesting and important.

Speaking before the Southwestern Railway Diesel Club recently in Dallas, Texas, he stated that fuel problems are incompatibility of blends, and sparking and that residue formation and mucking result when two unlike fuels are mixed. He showed slides of injector barrels and plungers coated with residue. "Certain additives," he said, "contribute to the problem of sparking where glowing particles are released from the exhaust of the diesel, but nonmetallic, ashless additives do not contribute to this sparking. Another fuel problem is caused by the presence of copper mercaptides and then he demonstrated this by showing how a cuprous solution, when added to a diesel fuel, will cause the fuel to jell."

Listing 34 diesel fuel tests, which have been investigated by Du Pont, Robinson said none of these

TABLE 1—CHARACTERISTICS OF DIESEL FUELS

	A.S.T.M. No. 2-D	Fuel A	Fuel B	Fuel C	Fuel D
Cetane number	40 min.	53.6	44	35	47
Vis., S.s.U. at 100° F.	32.0 min., 45 max.	....	39.0	39.0	42.2
Pour point, °F.	10° F. below ambient	+5	+10	+10	+30
Sulfur, wt. %	1.0 max.	0.49	0.79	0.81	<0.2
Carbon residue, wt. % on 10% bottoms	0.35 max.	0.54	0.01	0.40	....
Distillation range, °F.	90% 675 max.	50%—510 E.p.—676	90%—630 E.p.—680	90%—610 E.p.—665	E.p.—750
Stability		Unstable	Unstable	Unstable	Unstable

tests is 100 per cent accurate, but that individual railroads have been successful in using some of them as controls. He emphasized that the final test, of course, is in actual field performance. For a copyrighted article in The *Oil and Gas Journal* Robinson had prepared the accompanying table of diesel fuel characteristics and in this connection he said that the A.S.T.M. classification lists one per cent sulfur as a maximum but most railroads would not tolerate more than over 0.5 per cent by weight. A rule of thumb in the railroad industry is that the price of diesel fuel should be reduced one mill per gallon for each 0.1 weight per cent sulfur in order to counteract increase in maintenance expense resulting from high wear rates attributable to high sulfur fuels.

Fuel A in the table is a composite of four economy fuels taken from a wayside tank for fueling locomotives. From ¾ cents to 4½ cents per gallon savings were made on fuels in the composite samples. Although this blend had good cetane rating, a moderately low pour point and moderate sulfur, the real objection to it, other than high carbon residue value was that its instability required use of an additive to assure satisfactory operation. In the matter of stability of most economy diesel fuels, the build up of residue on filter elements can be expensive and can cause road failure of a locomotive by fuel stoppage. Varnish formation in injectors causes sticking. Partial plugging can cause the injector to overheat and aggravate plunger sticking. We illustrate here some badly plugged sinterized bronze filters from a locomotive which was burning unstable fuel. In sharp contrast to this condition filter elements are shown which had been in service twice as long on fuel containing an additive than an unstabilized fuel and results were much more satisfactory.

Sparks at the diesel exhaust are a problem in varying degrees in many services of the engine. During the World War they sometimes revealed the location of motor vessels to prowling submarines and arresters were installed to eliminate them. Numerous examples and explanations could be made in conjunction with preventive measures which can not be employed on locomotives. That this condition is considerably aggravated in locomotive diesel services can be attributed to some extent to varying loads, idling periods and more recently to use of economy fuels. Ejections occur during heavy load periods and are a potential right of way fire hazard.

Commenting on this situation, Robinson states that the metallic type additives reduce the glow temperature of the carbon deposits causing them to glow or burn. The burning helps release the deposits from the exhaust stack so that they are blown out of the locomotive in the glowing condition. The organic or ashless additives do not reduce the glow temperature of the carbonaceous deposits. Under most conditions, the temperature in the exhaust stack is not sufficiently high to ignite the deposits. In addition, the ashless additives do not bind the carbonaceous deposits so that, if particles issue from the stack, they are very small and cease to glow almost immediately after leaving the stack. Referring to the chart of economy diesel fuels he states that fuel B, C and D have been used extensively. Two are high in sulfur; one is low in cetane number and another is high in end point at 750° F. and in pour point at 30° F.

In the matter of stability, it is worth mentioning here that in some industrial and marine installations of diesels burning residual fuels complete dependence is placed upon the centrifugal purifier and filter cleaning coupled with constant maintenance of a suitable temperature for injection and atomization.

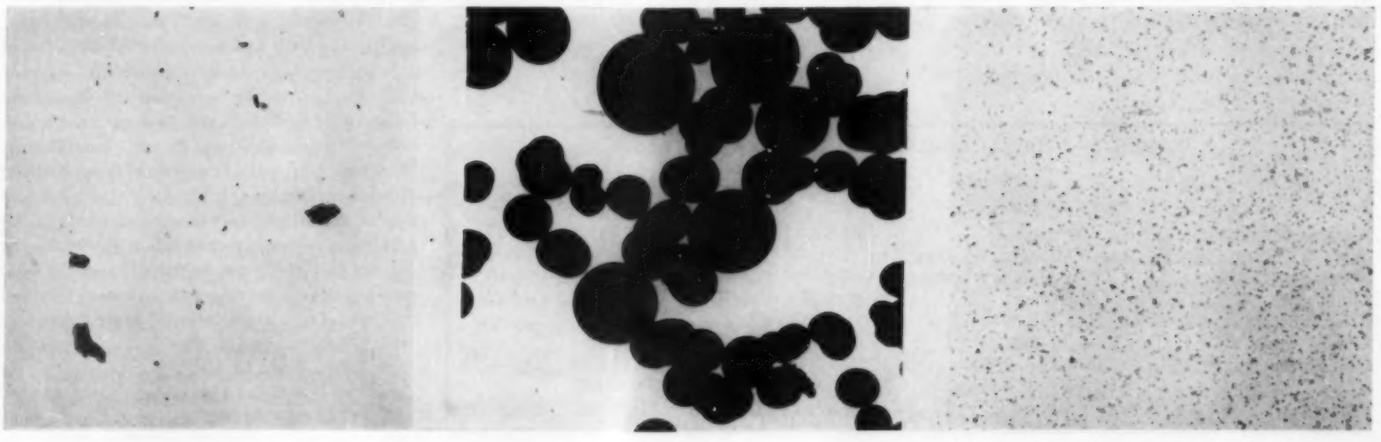
Although the cleaning process breaks up the agglomerates, they re-form and for that reason the time lag between the mechanical process of dispersing them and actually injecting the fuel into the engine must be properly controlled. The locomotive's space limitation prevent use of the bulky equipment needed to time the interval between processing and using the fuel.

Some railroads encountering the stability problem are using the electron microscope and we present microphotographs where a diesel fuel blend was photographed originally and after 110° F. storage with and without a stabilizer. Deterioration of the fuel and effect of a stabilizing additive are shown. Some controversy over the use of the electron microscope has arisen because dispersion of particles is desired and agglomerates are believed to be harmful and no exact correlation between microscope results and field experience exists. However, the instrument has proved useful in the prediction of storage stability of fuel.

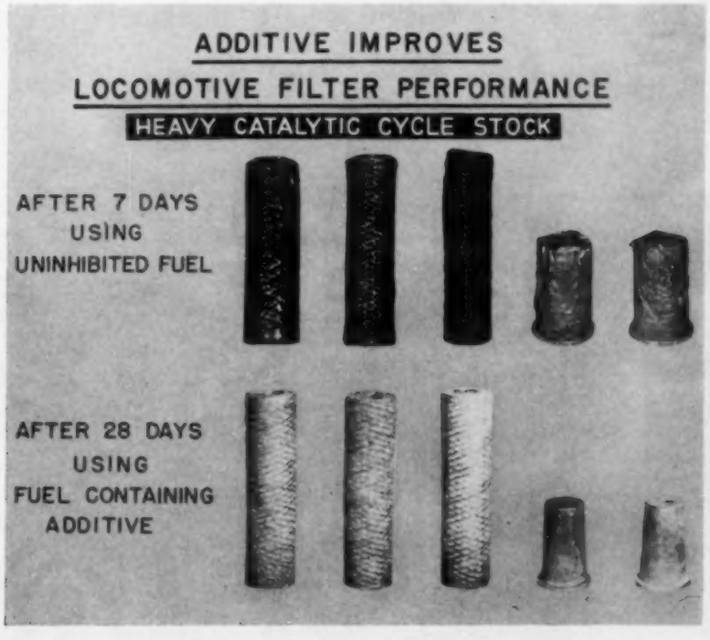
While the use of a stabilizing additive as presented here will undoubtedly contribute to the more successful use of economy fuels, it should be pointed out that such fuels are many and varied in character. In many diesel plants the residuals are looked upon as the prime item available at low cost. However, the refiners make price adjustments based upon their own production and merchandizing economy. Relaxation of fuel specification by the railroads have enabled refiners to reduce processing costs. Available catalytic cracking capacity is another factor affecting economics. Climatic conditions of some regions and the demand for household heating fuel may be an influencing factor. Relatively consistent demand for gasoline and excess cracking capacity may reduce the conversion level and shift the straight run distillate to the cracking unit. Source of crude petroleum has a bearing on the availability of low cost fuels because the chemical compositions of crudes vary with oil well location.

As for use of residual blends by the railroads, tests are being made for the purpose of overcoming inherent problems such as incompatibility amongst different residuals blends, the need to maintain constant temperature on the fuel and the difficulty inherent in the use of residuals under widely varying loads and while idling. In this struggle to minimize locomotive operating costs through the use of many different kinds of economy fuels it is apparent that the combined efforts of many men and corporations will continue because there seems to be no way of standardizing fuels and also maintaining or creating low price.

Photomicrographs of a diesel fuel blend before and after storage at 110° F. Illustration at the left shows fuel at start of storage time; center is the fuel with no additive and at the right after 12 weeks with FOA No. 2. Modification is 2730 times.



Du Pont's Bill Robinson boards a diesel locomotive to observe performance. He has traveled many thousands of miles to study fuel performance at first hand in the field.


ADDITIVE IMPROVES
LOCOMOTIVE FILTER PERFORMANCE
HEAVY CATALYTIC CYCLE STOCK
AFTER 7 DAYS USING UNINHIBITED FUEL
AFTER 28 DAYS USING FUEL CONTAINING ADDITIVE

Two different types of filters in economy fuel reveal similar results. The ones at the top ran a week without a fuel additive and the lower ones ran 28 days with inhibited fuel.

The filter at the left ran one week in a locomotive burning untreated economy fuel. The one at the right ran three weeks with similar fuel treated with Du Pont Fuel Oil Additive No. 2.

THE SIX HUNDREDTH TRAWLER

By DOUGLAS SHEARING

ANOTHER milestone launching was added to the unparalleled record of Diesel Engine Sales, Inc., on February 9, when its 600th trawler, the *Mary Call Collins,* was launched from its main yard in St. Augustine, Florida. The 67′ boat was named in honor of the wife of Florida's governor, Leroy Collins. Mrs Collins christened the boat that bears her name, as a crowd of more than 500 looked on. The launching marked the continuance of a production pace set by Diesel Engine Sales that is unmatched in the shrimp industry. Under the leadership of L. C. Ringhaver, the firm's dynamic president and general manager, Diesel Engine Sales has built 600 boats in the 14 years following its founding in 1943, accounting for approximately 75% of all shrimp boats built during that period. The last hundred vessels have been produced from the firm's assembly-line facilities in a period of 19 months. The yard is presently operating at an output of six trawlers per month.

The *Mary Call Collins* has been delivered to the Versaggi Shrimp Company, and now operates with the portion of its huge shrimping fleet working out of Brownsville, Texas. The boat brings the size of the Versaggi fleet to 40 vessels, and constitutes the 29th trawler built for the company by Diesel Engine Sales. The five Versaggi brothers, John, Virgil, Manuel, Joe, and Dominick, operate their boats out of Tampa, Florida; Patterson, Louisiana; and Brownsville, Texas. The number of dignitaries present at the launching pointed up the importance of the shrimp industry to the economy of Florida. On the launching platform, besides Governor and Mrs. Collins, were U. S. Representative S. A. Herlong; State Senator Verle A. Pope; State Representatives F. Charles Usina and Nathan Weinstein; Ernest Mitts, director of Florida's State Board of Conservation; James S. Melton and L. C. Ringhaver, owners of Diesel Engine Sales, Inc.; and the five Versaggi brothers. Preceding the launching,

A diamond wrist watch, memento of the christening of the *Mary Call Collins* is presented to Mrs. Leroy Collins, wife of Florida's governor by L. C. Ringhaver, president of Diesel Engine Sales, Inc. of St. Augustine, Fla. The vessel christened by Mrs. Collins is the 600th trawler built by the Florida shipbuilding firm since its founding in 1943.

The five Versaggi brothers, whose shrimping fleet of 40 boats is one of the largest in the industry, assemble on the dock after the launching of their newest shrimper, the *Mary Call Collins.* The five brothers will operate the boat out of Brownsville, Texas. She is powered with a Caterpillar D342 marine engine, which delivers power through a Twin Disc 2.96:1 reduction gear and 3″ bronze propeller shaft to a four-bladed 50 x 34 Columbian bronze propeller.

Ringhaver told the assembled crowd of his company's faith in the shrimp industry and of their continued efforts to back up the industry with more and better boats. He introduced John Versaggi, oldest of the shrimping brothers, who spoke of the pride he and his brothers had in owning the 600th trawler produced by the company. He also paid tribute to all who had contributed to the growth of the shrimp industry, and made especial mention of his father, Salvatore Versaggi, who rose from being a New York longshoreman in 1925 to operate a fleet of ten boats, which served as the basis of the huge fleet now operated by his sons.

John Versaggi further congratulated L. C. Ringhaver and the men comprising his staff on the quality and method of their manufacture. He then presented Governor Collins with a scale replica of the *Mary Call Collins*. The Governor then congratulated Ringhaver and the Versaggis for their accomplishments in adding to one of Florida's most important industries. He added that the boat means much to the Collins family, and that "it bears a wonderful lady's name." After Mrs. Collins had broken the traditional bottle of champagne on the stem of the flag-bedecked vessel, and it had slid into the waters of the San Sebastian River, the boat was drawn up to a near-by dock and members of the crowd were given rides around the harbor. The launching was followed by a barbecue in the Diesel Engine Sales, Inc. building shed, at which Ringhaver served as host. The barbecued shrimp, lamb, and beef enjoyed by the guests were prepared under the direction of Dr. H. E. White, widely-known for his skill as a barbecuemaster.

The *Mary Call Collins* is typical of the standard 67′ trawlers manufactured by Diesel Engine Sales. Designed by Tams, Inc., it has an 18½′ beam and 6½′ draft, and boasts the speed and seaworthiness necessary to work today's far-flung shrimp fields. This vessel, as well as the entire Versaggi fishing fleet, is powered by a Caterpillar diesel marine engine. In this case propulsion power for the *Mary Call Collins* is privided by a Caterpillar D342 marine engine, having a continuous horsepower rating of 210. This six-cylinder, four-cycle diesel engine has a 5¾″ bore and 8″ stroke, and operates at 450 standard low idle rpm. Power is delivered to a four-bladed 50 x 34 Columbian Bronze propeller through a Twin Disc 2.96:1 reverse and reduction gear and 3″ bronze propeller shaft. A Twin Disc front power take-off is used to operate such auxiliary equipment as the Stroudsburg triple friction drum hoist.

The boats preceding the *Mary Call Collins* as "hundredth" trawlers manufactured by Diesel Engine Sales, include the *Jim Melton*, the 100th boat to be launched; the *Sunshine*, which was the 200th; the *Tern*, the 300th; and the 400th, christened *Miss Four Hundred*. The 500th trawler, also launched by Mrs. Collins, was the *Goodwill*.

The *Mary Call Collins* 600th trawler built by Diesel Engine Sales, Inc. of St. Augustine, Florida, returns to her dock in the San Sebastian River, after a trial-run following her launching. She is powered by a Caterpillar D342 marine engine and will join the Cat-powered fleet of the Versaggi Shrimp Co. as its 40th shrimping vessel.

NEW WORTHINGTON MODEL SLHC ENGINE

A Discussion of the Principal Features of This New Worthington Turbocharged Engine-Compressor by Arnold B. Newell

THE first installation of a new Worthington SLHC 6-cylinder gas engine compressor started operating in a field gas gathering station of the Northern Natural Gas Co. at Muncie, Oklahoma late in 1956 and has been working with conspicuous success since then. It pumps gas from some 25 wells to the company's main line station at Hugoton, Kansas.

This is the first unit of its kind in the medium power range of 330 to 880 hp employing the tremendous advantage of exhaust gas turbocharging. It is fully expected that the installation and operation will be watched with the keenest interest by the entire petroleum industry observing its performance compared with that of older atmospheric engines of two and four-cycle type now in general use in so many gas pumping installations.

Some sixty years ago the Worthington Corporation pioneered in the design, manufacture and application of internal combustion engine-compressor combinations. The early horizontal units, some with a five foot stroke were massive slow-speed, cumbersome machines by today's standards. However, as I can attest from personal experience in the field they were also smooth running, quiet and as dependable as any engine could be. Many of them are still operating daily performing as well or better than they did when new. In the following years several sizes and types of engine compressors were built by Worthington, amongst these the first angle design announced in 1927. This was a 4-cycle unit, but of course it could not have the advantages of turbocharging which appeared on the scene many years later.

We find incorporated in the SLHC many of the excellent features that have been tested and proved by experience. The new engine reveals a dramatically improved structural design worthy of engineering consideration.

Worthington recently completed a five year engine research project with results revealed in the overall design of this new unit. Extreme reliability and high efficiency were specifically set as prerequisites of the SLHC for the field applications demand rugged machinery. These fields can be grouped as gas gathering, transmission and distribution—natural gas storage, natural gas plants, gas and air lift, oil field pressure maintenance and repressuring—and also in the petrochemical industries, refrigeration and general plant air supply fields.

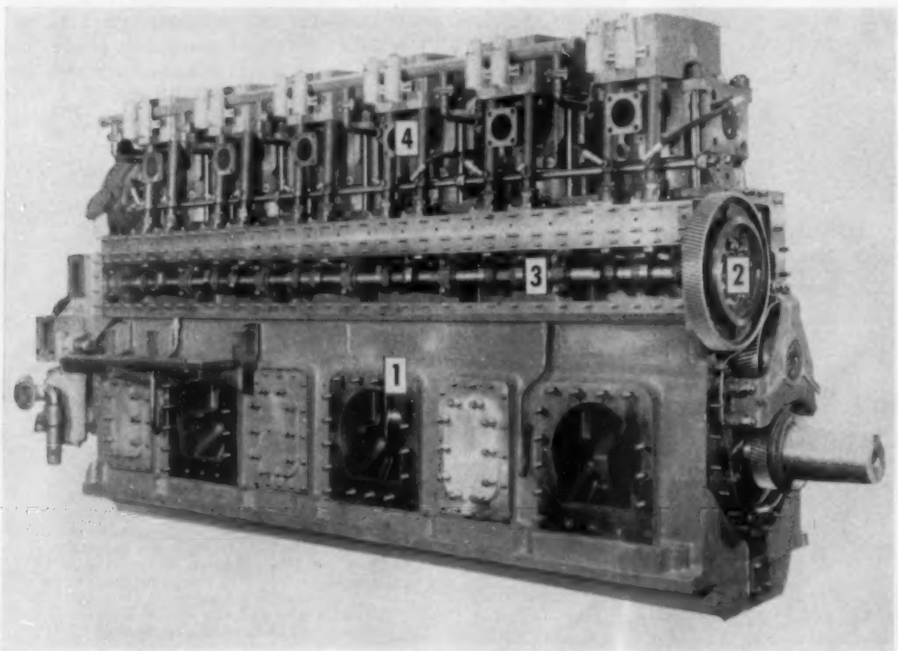
For these various services there is a Worthington designed compressor cylinder available and when required compressor cylinders can be mounted on both sides of the engine, all equipped with the Worthington feather valves so well known for their high efficiency and dependability.

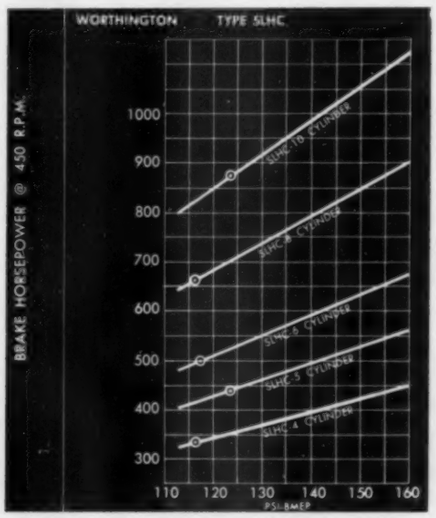
There are SLHC sizes available in 4, 5, 6, 8 and 10 cylinder combinations, all of inline design. The accompanying chart of power curves reveals conservative bmep with horsepower rating at 450 rpm. The encircled spots indicate current ratings. However, by using air after-cooling higher ratings can be obtained.

Structurally the engine embodies a base of heavy cast iron ribbed to give ample support for the large crankshaft and major engine elements. There is a large lube oil header cast into the base carrying cool, filtered oil to the bottom of each main bearing and then through the crankshaft to the connecting rod and wrist pin bearings and on into the oil cooled pistons, through drilled passages.

Maximum dependabilitiy is symbolized in every detail of the frame which is also a rigid heavy iron

Shop assembly view showing: (1) rugged base and frame; (2) exceptionally heavy, helical cut, steel gear train with sturdy mounting bracket; (3) heavy duty cams and shaft; (4) deep, rigid cylinder heads.



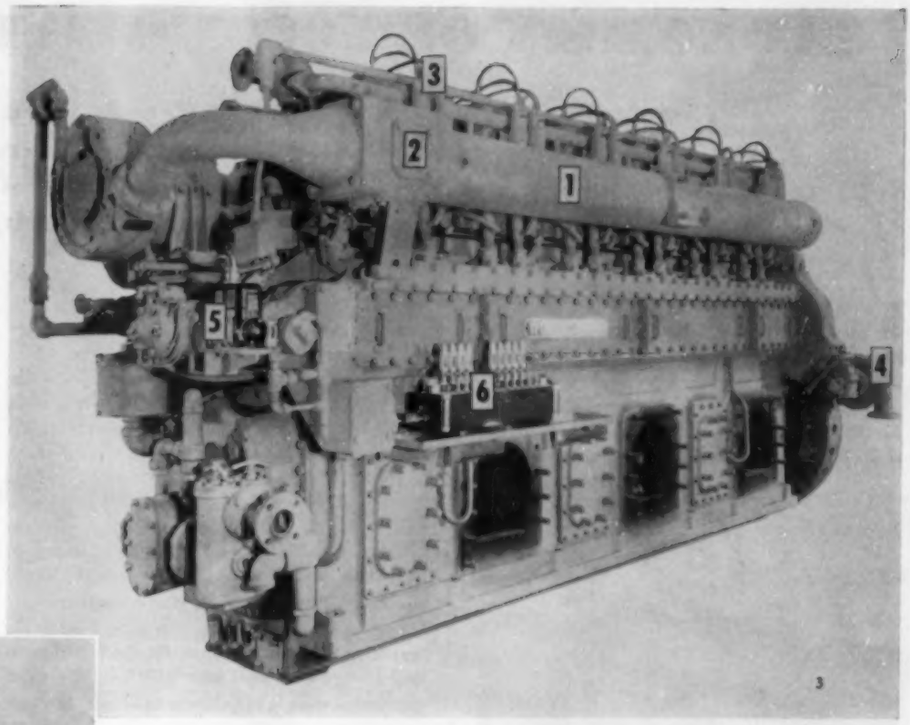


Circled dots show current ratings of various cylinder combinations. With air after-cooling, higher ratings can be offered.

casting forming the engine backbone and seating surfaces for the cylinders, heads, camshaft, gear drives and manifold members.

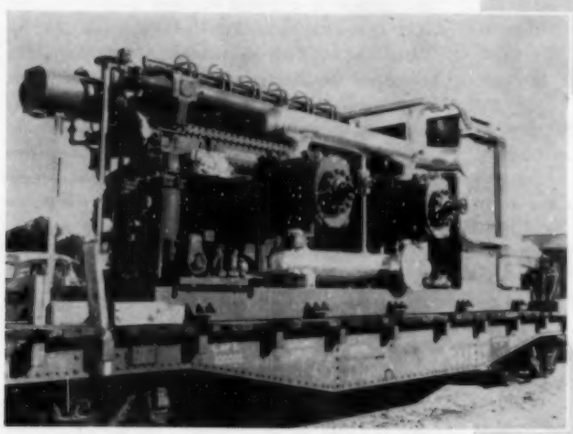
The cylinders incorporate a liner and jacket in a single casting thus eliminating a water seal at the frame seating and preventing leakage into the crankcase. This feature has been employed successfully in the larger Worthington SUTC engine compressors. There is directional baffling to guide the cooling water flow from the bottom to the top outlet. The design is particularly well suited to high temperature cooling which is desirable in many types of engine applications.

The pistons are of conservative design with symmetrical crown to eliminate uneven expansion stresses. Flood cooling is provided in a large in-

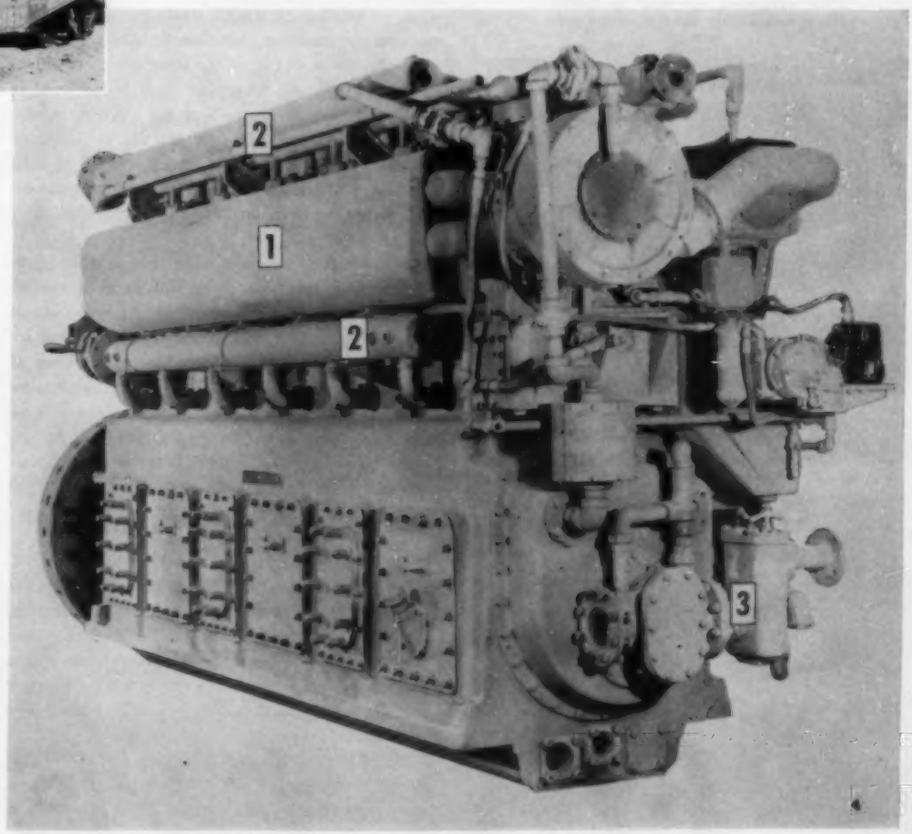


Camshaft side (with mountings for compressor cylinder cross-head guides) showing: (1) large inlet air manifold; (2) single balanced type air and gas mixing valve; (3) heavy duty spark coils—two per cylinder; (4) gear driven cooling water pump; (5) starting air distributor and low tension magneto; (6) compressor cylinder lubricator.

The Model SLHC Worthington 6-cylinder gas engine compressor as it was shipped to the Northern Natural Gas Company, Muncie, Okla.



Exhaust side of engine showing: (1) dry insulated exhaust manifold of individually cast sections connected by sliding ring-type expansion joints; (2) large inlet and outlet jacket water cooling manifolds—mid-side and top; (3) oversized lube oil pump and strainer.



ternal reservoir under the piston crown and directly opposite the top fire control rings. A full floating wrist pin is used.

The camshaft which runs in precision bearings, mounted on the main frame, is driven by an oversize helical cut gear train. The idler gear is carried in anti-friction roller bearings in a large bracket outboard of the frame. The governor drive is a level gear integrally mounted with the main camshaft gear arrangement.

The manufacturers state that this angle engine compressor is the only one in its horsepower range incorporating the many advantages of turbocharging which takes its energy from the exhaust gases and raises the pressure for cylinder charging. This feature is very important where power portability, efficiency and reliability are combined as application considerations. There is a dry insulated exhaust manifold leading to the turbine side of the charger. By eliminating water cooling for the exhaust manifold there is less heat rejection to the cooling water permitting use of smaller, less costly water cooling radiators. The engine operates quietly and smoothly at all loads over its entire speed range and it has a good running balance.

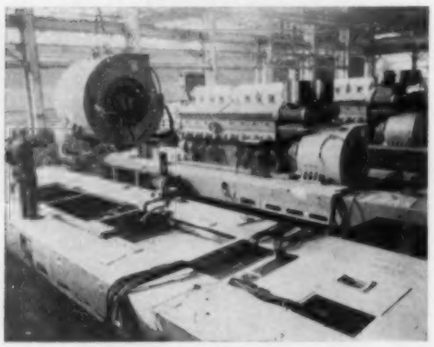
ECONOMICS OF LOCOMOTIVE UPGRADING

This Article Is Based On Material Presented In A Recent Talk By Mr. N. C. Dezendorf, General Manager and Mr. Milton Gardner, Assistant General Sales Manager of Electro-Motive Division of GM Before the New York Society Of Security Analysts.

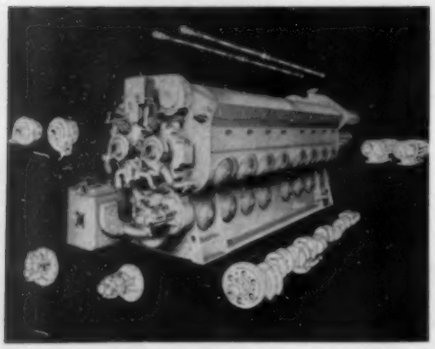
IN the fall of 1956 Electro-Motive completed producing its 18,000th locomotive, and the steam fleet has been reduced to 3500 locomotives in service. The diesel is now performing about 90 per cent of the useful work on the American railroads. With this level of dieselization, a considerable change in outlook has taken place, both in the locomotive business and on the railroads with respect to motive power.

The finished conversion—a modern 1750 hp GP9 locomotive.

First equipment mounted to underframe is a higher capacity main generator.



Long-life parts of old engine that are reused in conversion to new engine model are shown below.



The railroads all are accepting complete dieselization as almost an accomplished fact. Those with steam power in service have well defined programs for their early retirement. Completely dieselized railroads are projecting their future requirements in terms of growth in the transportation requirements of an expanding economy. It is significant that over one-third of Electro-Motive's business in 1956 came from railroads who considered themselves completely dieselized one to three years ago. Many of the earliest users of diesel locomotives are beginning to reach the point, for the first time in their history when they must undertake the major overhaul of units bought twelve to fifteen years ago.

EMD locomotives were designed for the easy replacement of major components, such as engines, generators, traction motors, auxiliaries, so that the locomotive itself could spend a maximum time working on the line and a minimum of time in the shop. The usual cycle for replacing these major components has been six years on the average. However, after the second cycle, in addition to renewing the major components, extensive recablization, reworking of trucks, structures, control apparatus and running gear must be made. This necessitates the shopping of the complete locomotive. The need for such shopping on a broad scale is just beginning to occur. Now the question arises, should such locomotives be rebuilt in kind, or should they be modernized and upgraded to take advantage of the great improvements in technology which have been made in the meanwhile?

Electro-Motive engineers have studied this problem for the past two years and have developed solutions for the various models of early diesel locomotives, which offer attractive returns on investment to customers. This subject is a matter of great importance to railroads, and the conversion of a typical unit to a modern locomotive will be discussed. The following is a description of the upgrading of the earliest EMD freight model, the Model FT, to an up-to-date general purpose 1750 hp GP9 locomotive that is in current production.

One thousand sixty-five of the 1350 hp model FT freight locomotives were built in the period 1941 through 1945, and were delivered to 23 railroads. Since 1945, four successive new freight locomotive models, each with greater hauling capacity, have made substantial improvements in economies over the FT. Many of these old FT locomotives have accumulated over 1,750,000 miles in heavy duty freight service and in addition have reached a point where extensive heavy repairs are necessary on the entire locomotive.

The conversion of this old locomotive to the modern versatile 1750 hp GP9 locomotive is done in the following way. To start, a new underframe is built and placed upside down in the production line, where new piping, wiring and other underneath equipment is readily installed while the underframe is in this position. A new fuel tank and reservoirs are installed. The next step is to turn the underframe right side up. At this stage, the equipment mounting surfaces are still in the rough, and these surfaces are machined for the mounting of the engine, generator and the air compressor. The first equipment mounted to this underframe is a higher capacity main generator. The next component installed is the new 1750 hp diesel engine. This 16 cylinder 567C engine is the third new model development since the original engine was installed in the FT locomotive. This is the first point where any of the FT locomotive is used in the conversion. Long-life parts of the engine such as camshafts, blower, crankshaft, oil pumps and water pumps, all of which have been remanufactured, are used again.

After the engine has been mounted in place and coupled to the main generator, the next item for application is the electrical control cabinet. Here the remanufactured reverser and voltage regulator of the FT locomotive are modernized to current design and applied to the production electrical cabinet. All of the remaining equipment, including the cabinet itself, is new. A new cab assembly, with short hood, with all new equipment, such as control stand, air brake, speed recorder, etc. is installed. The remaining deck mounted equipment is installed at the front end of the engine. This includes air compressor, lubricating oil filter, lube oil cooler, water tank and fuel pump. Exhaust manifolds are also applied to the top of the engine. All of these components are new equipment.

The truck assembly constitutes the major component of the locomotive used in the conversion. The trucks are completely remanufactured with a number of improvements incorporated, bringing them up to the current design. Some of the improvements are in brake rigging, gear cases, sander guide castings, change from dual to triple coil springs, new pedestal liners, and brake rigging stabilizers. Traction motors are converted to present day models which includes remanufacture of a number of items-brush holder studs, air baffles, silicone armature coils, improved axle caps and axle bearing lubrication, D37 stator coils and new armature bearings. The motor is brought up to the current model design and output.

Then, finally the locomotive is lowered on its trucks and goes through the standard testing procedure given new locomotives before being re-

turned to the railroad. To compare performance we will quote some facts here and there are also illustrated charts with this article which give further comparisons. Most railroads operate their FT locomotives in four unit consists. At 40 to 60 mph operating speeds, a four unit GP9 locomotive will pull at least 34 per cent more tonnage than a four unit FT locomotive. Sixteeen FT units, necessary to pull four trains, can be replaced by 12 GP9 units, which can handle the same tonnage in only three trains.

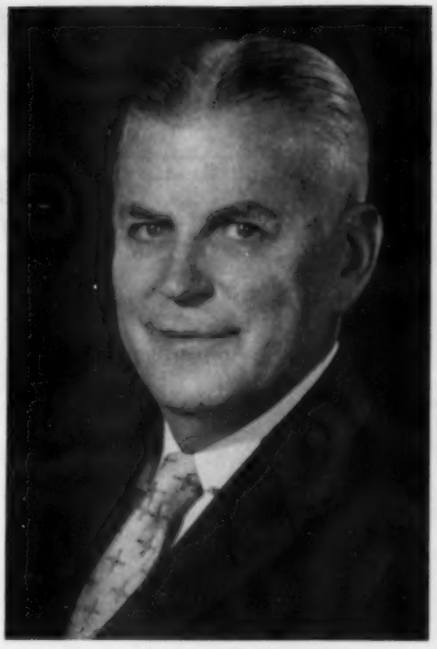
In cost comparisons, a railroad with a worn out FT locomotive can realize a 22 per cent saving on its investment in a new locomotive by making this conversion. A new locomotive with $20,380 worth of extra equipment, costs $179,880. The conversion, a comparable locomotive, with the same new extras, costs $140,180—a savings of $39,700.

Mr. Dezendorf gave some closing comments on the economics of the entire railroad picture as it concerns the diesel locomotive and we think it is very worthwhile to go into some details on them as follows: "We in Electro-Motive believe that a major contribution can be made by capitalizing on the technological advances made in the past ten to twelve years. Although this is a comparatively new development, we have already converted 173 twelve-year old or older units for 15 railroads at a total cost of $20,500,000 on which these railroads will produce an added return on investment of at least $2,500,000 per year.

"In addition, we are currently working on firm orders and pending programs covering 284 locomotive units, which, when they are completed, will aggregate about $34,000,000, on which the added return on investment to the participating railroads will exceed $4,200,000 per year. I stated earlier that the railroads had to replace only 3500 steam locomotives to achieve complete dieselization. This can be done over the next three years at the rate of purchasing which is presently going on, with some 3000 diesel-electric units, at a total cost of approximately $540,000,000, to do the whole dieselization job, the remaining job on the American railroads.

"By way of comparison with this figure, approximately 7,750 locomotive units will be due for major rebuild within the next five years. Of this total, 1,050 are 1350 hp Model FT and 6,700 are 1500 hp Model F3 and F7 units. The average cost for the rebuilding of these units with no upgrading would be $40,000 each. Additional cost for upgrading at the time the locomotive is being rebuilt would be $100,000 for the FT and $38,300 for the F3 or the F7.

"The work presently being done by the 7,750 units could be performed by 6,528 upgraded units. Should all 6,528 units be upgraded, maintenance and train mile reduction savings amounting to $335,000,000 could be realized in the first five years of their operation. The balance of 1,222 units we have assumed would be utilized in the future growth requirement of the railroads which we estimate will call for at least twice this quantity within the next five years. Upgrading economies for these units would amount to an additional $67,000,000 in their first five years of operation.

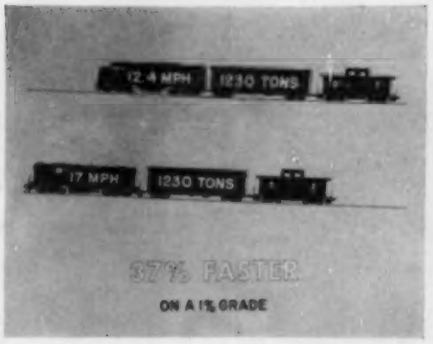


Mr. N. C. Dezendorf, Vice President of General Motors and General Manager of Electromotive Division.

"The capacity gained in the upgrading of the 7,750 units will be equivalent to 1,222 units or an investment of $206,000,000 in new locomotives. The rebuild and upgarding costs of these 1,222 units is $111,000,000. A saving in locomotive investment amounting to $95,000,000 could therefore be attained. Total upgrading operational economies and investment savings would amount to approximately $500,000,000 in five years.

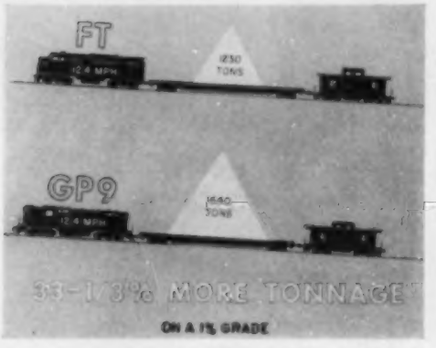
"So getting back to my earlier thesis—has the dieselization of American railroads ended their potential for saving?—I think the answer is No. The technology and improvements in product in the last ten years have made possible additional earnings to the railroads of $500,000,000 in five years, after expending additional investment of $671,600,000."

Old model FT locomotive, which can be converted to the modern GP9 all purpose locomotive pictured on opposite page.

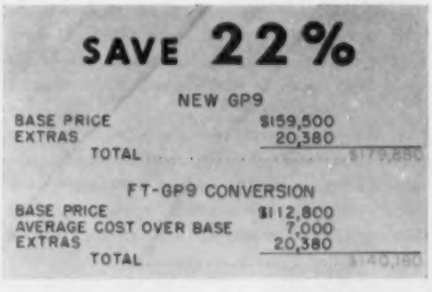


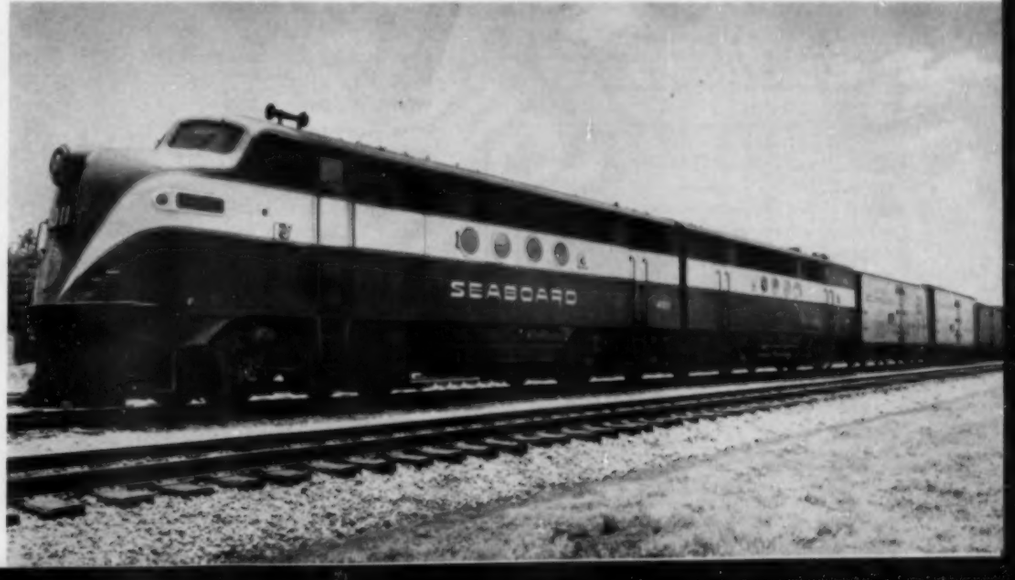
Speed advantage obtained with upgraded locomotive.

Tonnage advantage obtained with upgraded locomotive.



Shown below is the savings on locomotive conversion over buying a new locomotive of the same type.





TRENDS IN VALVE GEAR DESIGN

Excerpts and comments by Arnold B. Newell on a timely and interesting paper given by Carl Voorhies, Norman Felbinger and G. R. Bouwkamp of the Chicago Screw Company Division of Standard Screw Company at the SAE Annual Meeting in Detroit on January 17.

THE development of the diesel engine toward higher speeds and power output, has increased the requirements of the valve gear. This must of necessity be accompanied by a trend in valve gear design to compensate for the greater demands that are imposed on the valve gear parts. In the larger size engines, the situation is further complicated by the greater mass of these moving parts. In analyzing the problems involved, the effect of each of the components on the rest of the valve gear must be taken into account. The valve gear must be considered as a whole and not as individual parts; for example, increasing the rocker arm ratio results in higher loads on the push rod, tappet and cam. In the same manner, a significant change on any part affects the rest of the valve gear.

One problem, caused by increased engine speed, is false motion which occurs when the speed of the engine becomes such that the valve spring is unable to exert the force required to prevent separation of the valve gear parts. Excessive false motion may result in breakage of parts, pounding-in of valve seats, stretching of the valve stem, dishing of the valve head, tappet and cam failures. The speed at which this false motion will occur is a function of the cam design, valve spring design, and the mass, rigidity and natural frequency of the valve gear. Excessive false motion must be avoided if satisfactory operation is to be achieved and allowance in design must be made for the maximum speed to which the engine will turn. This maximum speed should include any overspeed in installations where it is likely to occur.

Cam design is a very important factor in valve gear dynamics. Engine performance dictates the valve timing, valve lift and to some extent the rate at which the valves will open and close. The maximum acceleration, as well as the rate of change of acceleration, is determined by the rigidity of the valve gear, while the deceleration is governed by the valve spring. In addition, there are many other factors which influence cam design such as maximum permissible contact stresses between cam and tappet, tappet diameter in the case of flat or spherical face tappets, manufacturing limitations in grinding the cam lobe and torque requirements of the camshaft.

The contact area between the cam and tappet particularly in the case of flat or spherical face tappets is a critical spot. The stress and rubbing velocities may be such that the film strength of the oil is not sufficient to prevent metal-to-metal contact, and in some cases subsequent wear and scuffing. Improved tappet materials such as hardenable alloy iron for use with hardened cast iron camshafts and alloy chilled iron for use with steel camshafts have greatly improved this condition. Also improved oils using e-p additives have contributed to reducing the wear and failure at this point. The push rod is generally the longest most flexible member of the valve train. Both solid and tubular push rods are currently being used and selection of the best type will depend upon the individual application. As the length is increased, the tubular push rod offers proportionately greater savings in weight while maintaining adequate stiffness. However, where the O.D. of the push rod is restricted, it is sometimes necessary to use a solid push rod for maximum strength within that diameter in spite of the weight penalty.

One other item to be kept in mind when selecting a push rod for an engine is its cross sectional area in relation to its length and the load to be encountered. Any reduction in this cross sectional area increases stress and longitudinal deflection for a given load. The effect on the rest of the valve train will have to be balanced against increased weight with increased cross sectional area, to obtain the best possible push rod for each installation. The valve spring's function is to supply the force required to counteract the inertia forces tending to separate the parts of the valve gear. Within the limitations of diameter and length, it is necessary to design a spring that will provide the proper load when it is required during the cycle, without overstressing the steel which may cause load loss or breakage. Also the natural frequency of the valve spring should be more than ten times the maximum camshaft rpm in order to obviate excessive spring surge and false motion.

In some cases valve springs with higher frequencies than necessary have been used. The high rate of these springs, coupled with the fact that adequate spring load must be maintained at the point of inflection of the cam, results in higher than required valve open spring loads. This may lead to excessively high contact stresses between the nose of the cam and tappet. Under these conditions the valve open load and rubbing velocity may be such that metal-to-metal contact may occur and the temperature of a flat or spherical face tappet may reach 1350° F. or more which will change the hardness of the surface of a steel tappet. In cases where this condition exists, the valve open spring load must be reduced or a material found which will withstand such temperatures with little metallurgical change.

In this trend toward higher speeds and loads it is advisable to reconsider various factors pertaining to the valve, such as: valve material, hollow stems for weight reduction, valve rotators and valve seat width and angle. The angle of the valve seat determines the way the gas load, acting on the head of the valve, will be transferred to the valve seat insert. For a given width of valve seat, this angle determines the width of the projected area in a plane perpendicular to the axis of the valve and the width of the projected area on a cylinder having a diameter equal to the mean diameter of the valve seat. Through the use of these projected areas the pressure of the valve seat and the load tending to expand the insert can be determined.

Assuming a peak cylinder pressure of 1000 psi and a 4 in. diameter valve, the load acting on the valve head becomes 12,566 lbs. With a .100 wide by 45° seat the axial pressure on the valve seat becomes 14,397 psi. The valve seat insert is also subjected to a radial pressure which will produce a tensile load of 2,000 lbs with the stress in the insert depending upon the cross sectional area. Under the same conditions with a .100 wide by 30° seat the

Fig. 1. This graph reveals the point at which the curve for a ⅜ in. diameter solid and a $\frac{7}{16}$ by .049 in. tubular rod crosses at 1680 lbs maximum load.

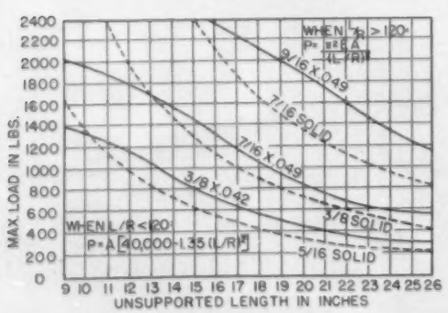
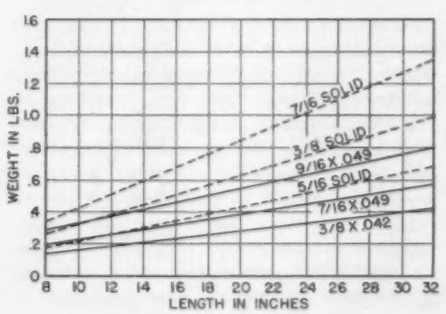


Fig. 2. Showing how weight of push rods in Fig. 1 varies with length making saving in a tubular rod amounting to 0.16 lb at 13 in. length while at greater length column strength of tubular rod is greater and saving in weight is proportionately increased.



axial pressure on the valve seat becomes 11,800 psi and the radial pressure on the insert will produce a tensile load of 1,154 lbs. In a complete cycle of the cam, starting with the follower on the base circle of the cam, the hydraulic plunger is actuated outwardly by the plunger spring to take up any clearance in the valve gear. As the high pressure chamber is filled with oil, the valve spring closes the check valve. As the cam revolves the engine valve is lifted by transmitting the load through a column of oil trapped in the chamber below the plunger. During the interval, when the valve is lifted off its seat, a slight oil leakage occurs between the plunger and the cylinder which is necessary to compensate for any expansion in the valve gear. During the valve closed period, the chamber below the plunger is replenished with oil, thereby eliminating all clearance.

Some of the advantages of using hydraulic lash adjusters are: constant valve timing, increased valve life, freedom from adjustment of valve lash, protection against broken parts and increased flexibility in the design of the cam contour. Use of the hydraulic lash adjuster permits the use of shorter opening and closing ramps and insures seating of valve at ramp velocity throughout entire operating range of engine. Shorter ramps permit valves

Fig. 4. Typical installation of hydraulic unit mounted on top end of push rod with oil fed from rocker arm.

Fig. 9. Valve timing control mechanism with cam link mounted on axcentric having automatic controls to position it. To vary timing according to engine load, eccentric moves link and roller follower travels back and forth across camshaft axis thus changing operating position of hydraulic unit. Linkshaft actuator which revolves eccentric changes timing. It is responsive to supercharger pressure.

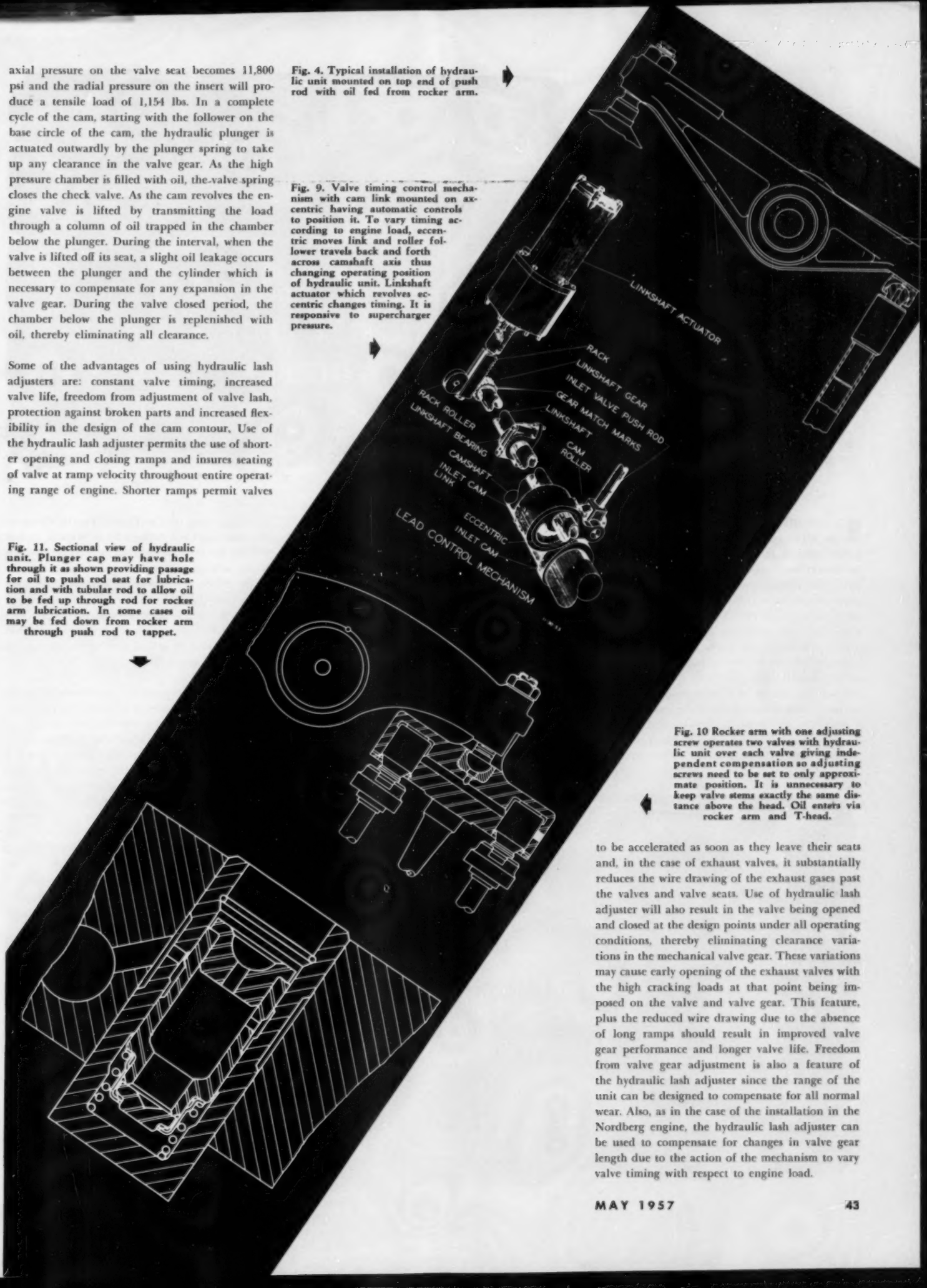


Fig. 11. Sectional view of hydraulic unit. Plunger cap may have hole through it as shown providing passage for oil to push rod seat for lubrication and with tubular rod to allow oil to be fed up through rod for rocker arm lubrication. In some cases oil may be fed down from rocker arm through push rod to tappet.

Fig. 10 Rocker arm with one adjusting screw operates two valves with hydraulic unit over each valve giving independent compensation so adjusting screws need to be set to only approximate position. It is unnecessary to keep valve stems exactly the same distance above the head. Oil enters via rocker arm and T-head.

to be accelerated as soon as they leave their seats and, in the case of exhaust valves, it substantially reduces the wire drawing of the exhaust gases past the valves and valve seats. Use of hydraulic lash adjuster will also result in the valve being opened and closed at the design points under all operating conditions, thereby eliminating clearance variations in the mechanical valve gear. These variations may cause early opening of the exhaust valves with the high cracking loads at that point being imposed on the valve and valve gear. This feature, plus the reduced wire drawing due to the absence of long ramps should result in improved valve gear performance and longer valve life. Freedom from valve gear adjustment is also a feature of the hydraulic lash adjuster since the range of the unit can be designed to compensate for all normal wear. Also, as in the case of the installation in the Nordberg engine, the hydraulic lash adjuster can be used to compensate for changes in valve gear length due to the action of the mechanism to vary valve timing with respect to engine load.

TWO PLAQUES FOR 1956 CARO, MICH. AND POPLAR BLUFF, MO.

By REX W. WADMAN

IN 1950 DIESEL PROGRESS initated, through the active cooperation of the Rural Electrification Administration in Washington, a contest to discover the most efficiently operated R.E.A. internal combustion engine plant. A special bronze plaque was to be awarded each year to the winning plant starting with 1951. For that year, the first of the contest, the prize was won by The Graham County Electric Co-op, Pima, Arizona. In 1952 it was won by the Wolverine Electric Cooperative at Big Rapids, Michigan, with the Missouri 60 running second. In 1953 Wolverine Electric Cooperative won it again and for the second year in a row, Missouri 60 was second. In 1954 Missouri 60 moved out of second place into first and won the plaque for that year. In 1955 Wolverine Electric with its Hersey plant bounced back into first place again, making them a three-time winner out of five times at bat and that year Missouri 60 with its Poplar Bluff plant slid into third place behind Scott City, Kansas.

Early in 1956 it was decided that because there were more comparatively small plants in this R.E.A. group than large, we would offer more encouragement to those smaller plants, so we announced two DIESEL PROGRESS plaques for 1956 and set up Division A as plants with 5,000 kw and under capacity and Division B with plant capacity of 5,000 kw and over. The competition in 1956 was every bit as keen as in the preceding five years, and coming down to the wire the Caro, Michigan plant of the Thumb Electric Cooperative just nosed out Arizona 20 at Marana, as you will see by the table on this page. The Division B was won quite handily for the second time by Poplar Bluff's Missouri 60. It was our pleasure to present the DIESEL PROGRESS plaques at the annual R.E.A. Managers Meeting in Kansas City on April 10th. Mr. James W. Owens accepted on behalf of Missouri 60 and Mr. Orville Hurford on behalf of Michigan 37.

On the following pages we are describing in detail the winning plants, as we always do each year, and on those pages you will find full information on the engines installed and the accessory equipment which went along to contribute to the fine over-all operating record. In arriving at the final figures which brought Missouri 60 and Michigan 37 to the top, we tabulated pertinent data such as size of plants, gross kilowatt hours generated, the percentage of station service, plant factor percentage, fuel costs, content of fuel used per million BTU, hp hours per gallon of lube oil, labor costs including operators, maintenance and material, which gave us a kwh total. We did not include fixed charges such as depreciation, interest, taxes, insurance or administrative overhead costs. Because of the large variations in the cost of fuel, whether it be oil or natural gas, in the various R.E.A. plants throughout the country it was decided before the contest was started back in 1950, that low fuel cost would be one of the larger factors affecting production expense, and inasmuch as the local cost of fuel had little or no bearing on the over-all efficiency of plant operation, all final costs have been calculated on the basis of a uniform 40 cents per million BTU for all plants.

Taking all the items mentioned, with the exception of leveling the fuel cost, here is how the first five Division A plants showed up for 1956 and immediately under it how the first five plants in Division B showed up for 1956.

1. Okla. 32**	Woodward	4.27 mills/net kwh
2. Kans. 44	Ulysses	5.58 mills/net kwh
3. Ariz. 20	Marana	5.90 mills/net kwh
4. Ariz. 17	Thatcher	6.80 mills/net kwh
5. Minn. 37	Jackson	7.22 mills/net kwh

**Oklahoma 32 based on January to November, 1956 data only.

1. N. Mex. 23	Lovington	3.85 mills/net kwh
2. Mo. 60	Poplar Bluff	4.24 mills/net kwh
3. Kans. 34	Great Bend	4.39 mills/net kwh
4. Kans. 51	Scott City	4.49 mills/net kwh
5. Ill. 18	Pittsfield	6.53 mills/net kwh

Now when we apply the fuel leveling measure of 40 cents per million BTU for all plants, the result of this adjustment brings about the following result insofar as the lowest production expenses are concerned. Division A is given first, followed by Division B.

1. Mich. 37	Caro	6.292 mills/net kwh
2. Ariz. 20	Marana	6.376 mills/net kwh
3. Okla. 32**	Woodward	6.519 mills/net kwh
4. Minn. 37	Jackson	6.970 mills/net kwh
5. Mich. 46	Portland	7.003 mills/net kwh

**Oklahoma 32 based on January to November, 1956 data only.

1. Mo. 60	Poplar Bluff	5.094 mills/net kwh
2. N. Mex. 23*	Lovington	5.642 mills/net kwh
3. Mich. 46	Hersey	5.891 mills/net kwh
4. Kans. 51	Scott City	5.978 mills/net kwh
5. Kans. 34	Great Bend	6.186 mills/net kwh

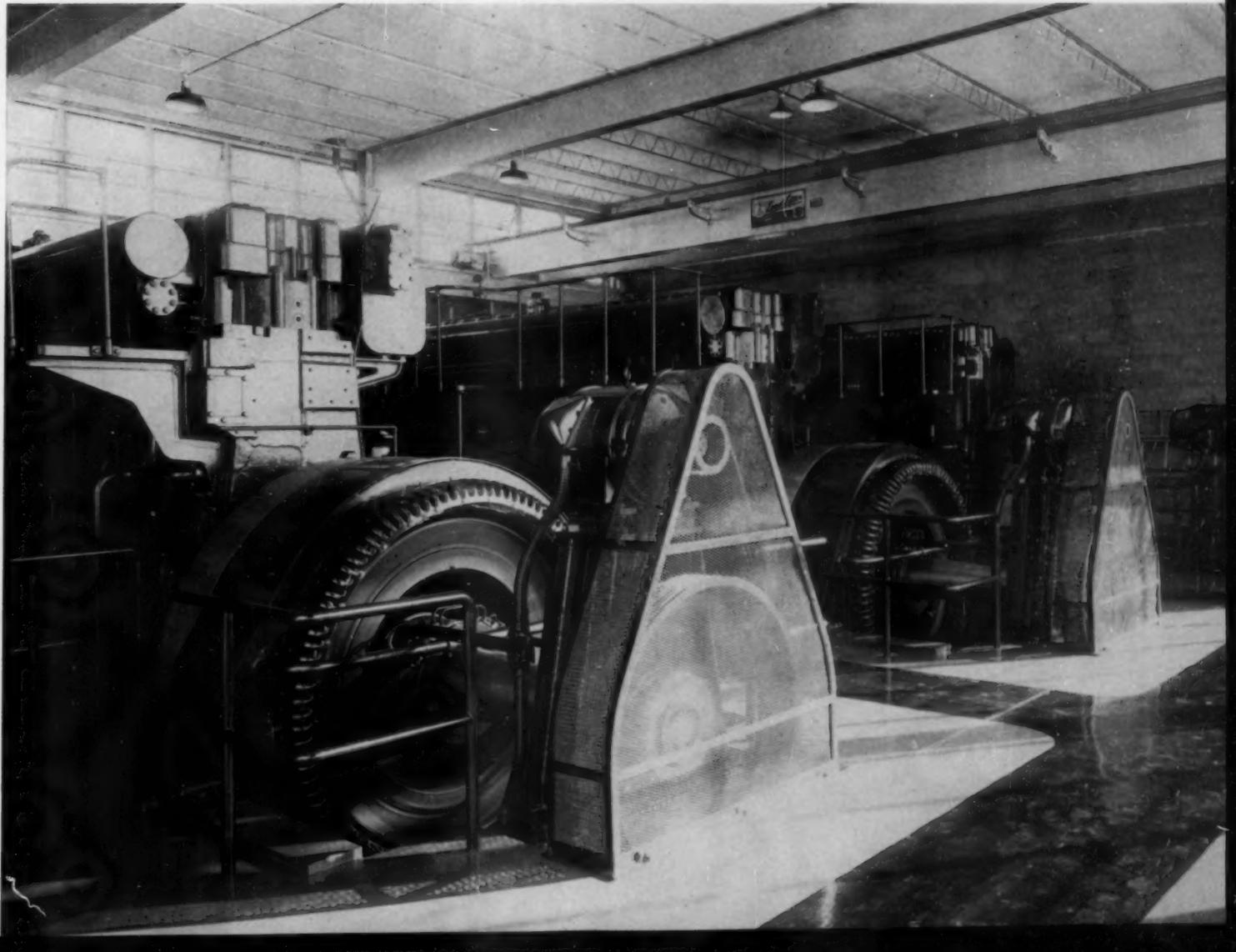
*New Mexico 23, Lovington plant, increased its installed kw to 16,030 kw in November, 1956.

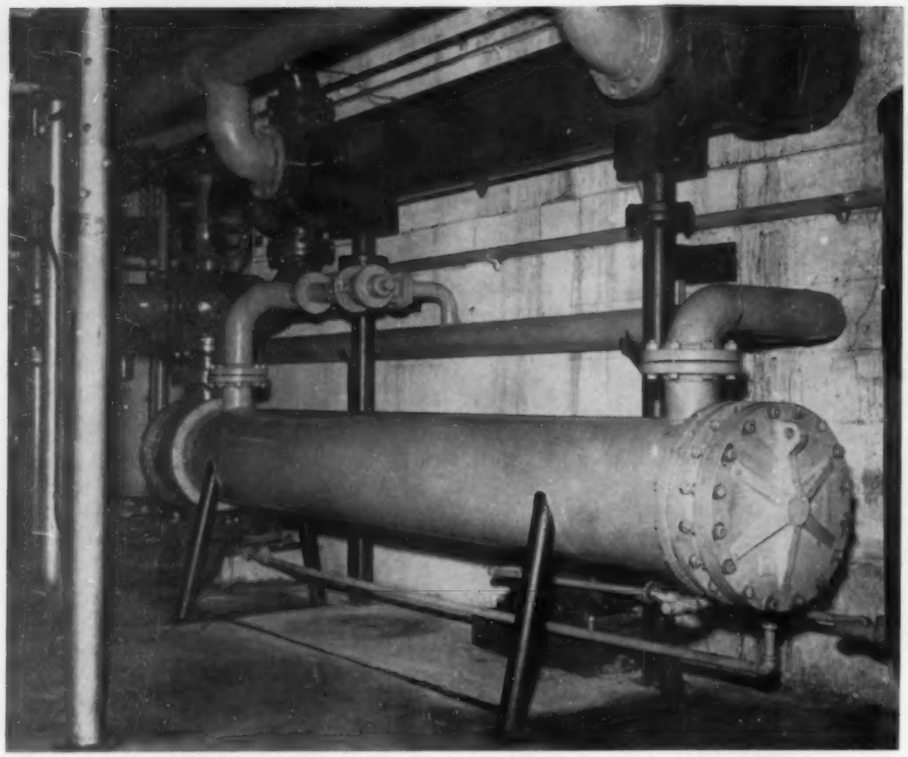
It is obvious from reading these figures that the contest was again a very close one, especially between the Division A plants where the race between the top three was extremely close. In Division B the race wasn't quite as tight as it was in 1955 but for second, third and fourth place it was certainly close enough with Great Bend breathing down the necks of all four of them.

I know that you all will join your editor in extending heartiest congratulations to Jim Owens and his capable crew at Poplar Bluff and Orville Hurford, with his equally capable group of operators at Caro. We hope and feel that this contest is contributing to the spirit of competition which is so helpful in increasing the over-all economy and efficiency of the R.E.A. internal combustion plants. A few simple changes have been made in the rules affecting the 1957 contest. Only plants who report to the R.E.A. in Washington their complete figures for the year 1957 on or before January 31, 1958 will be entitled to compete. The winner of one year drops out for the next year but can come back the year after. Any three-time winner since the contest started in 1950 "has had it" and will permanently retire from competition. Two plaques will be presented for the year 1957 just as we did for the year 1956.

DIVISION A WON BY CARO

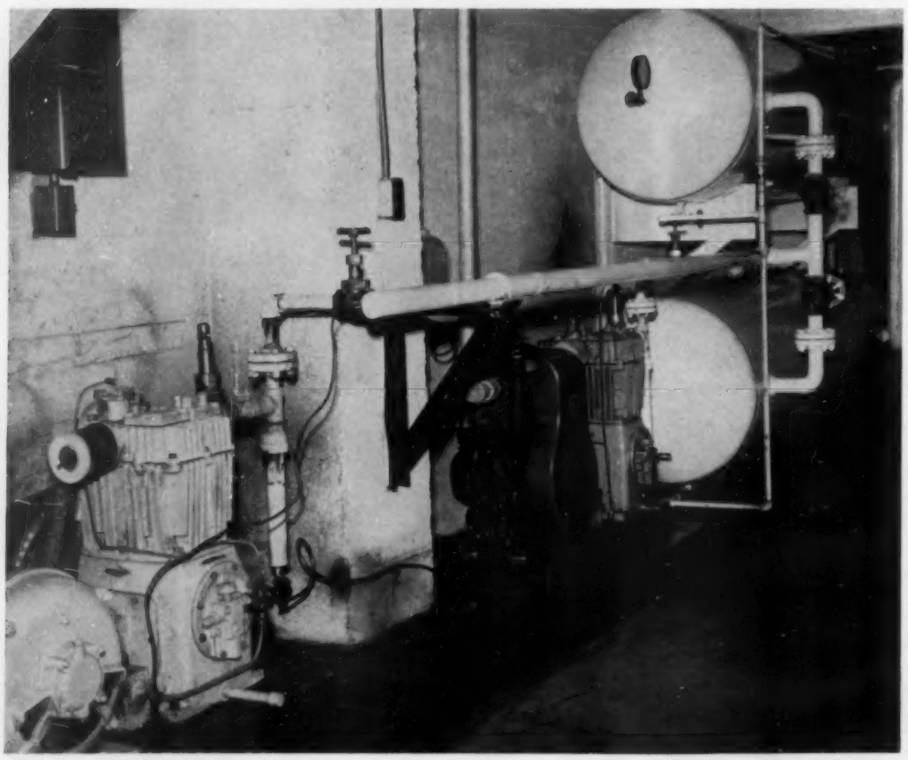
The main engine room of the Caro, Michigan generating plant with the three 8-cylinder Cooper-Bessemer turbocharged 1850 hp diesels rated at 327 rpm with a bore of 15½ and a stroke of 22. The generators and exciters in the foreground are all by Elliott. The standard engine equipment on all three engines consists of Woodward governors, Alnor pyrometers, Young turbocharger aftercoolers, Nugent fuel oil filters and Sinclair lube oil is used exclusively.





This view shows a portion of the Ross heat exchanger equipment used throughout the Caro plant, well installed, easily accessible for maintenance and of ample capacity for the service required.

Here you find the pair of Quincy air compressors installed at the Caro, Michigan plant of the Thumb Electric Cooperative. The one in the foreground is motor driven and the one in the background is Wisconsin gasoline engine driven. The big air storage tanks may be seen in the background. The clean appearance of the basement of this plant epitomizes the good housekeeping which characterizes the entire installation.

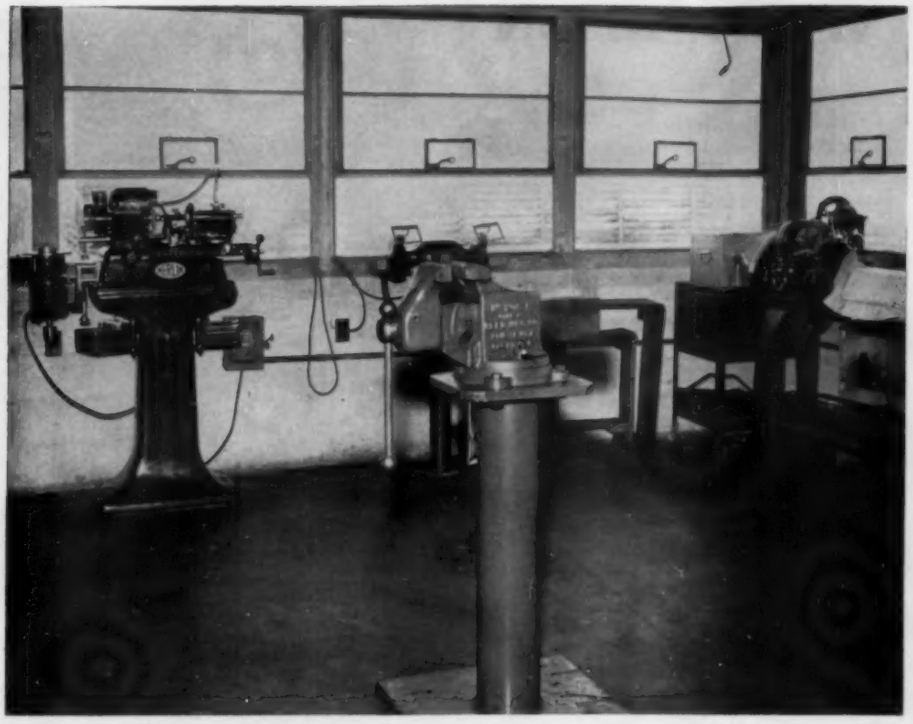


UP there in the Thumb of Michigan is located one of the oldest and most successful R.E.A. organizations in the country—the Thumb Electric Cooperative at Ubly, Michigan, known as Michigan 37. Located north and east of Flint and almost due east of Bay City is the territory covered by the Thumb Electric. The initial plant at Ubly was put on the line in 1938 with three Fairbanks, Morse diesels rated at 2102 kw and then in 1947 a 980 kw F-M was added, giving the installed capacity at Ubly of 3082 kw. The Caro plant of the Thumb Electric Cooperative about 40 miles south and west of the main plant was put on the line in 1949 with a pair of 1313 kw 8-cylinder Cooper-Bessemers to which was added another 8-cylinder 1313 kw Cooper-Bessemer in 1952, giving the Caro plant an installed capacity of 3939 kw. All three engines are turbocharged and are rated at 327 rpm and each has a bore of 15½ and a stroke of 22.

The aftercooling of the turbochargers on these three Cooper-Bessemer engines is very important because all three units are working on a highload factor and need every ounce of power they can produce. The aftercoolers, as might be expected, are Young Radiator units which are found on so many Cooper-Bessemer diesels, dual-fuel and natural gas engines. The principal equipment, which always proves interesting to our readers because the success of a diesel power plant depends so much on the selection of good accessory equipment, is, in this instance, Woodward Governors on all three engines; a pair of Quincy Compressors, one motor-driven, one gasoline-engine driven supply the needed air for the entire plant; and the generators and exciters come from the Elliott Company, with a rating of 1313 kw, 1459 kva—2400 v, 351 amps, 90% pf at 60 C.

The Caro plant in 1956 generated a total of 22,648,100 kwh and its fuel oil consumption was 14.17 kwh per gal. and 1,597,748 gallons of fuel oil were consumed in winning the top position of the Division A plants in the DIESEL PROGRESS contest. The cooperative has another generating plant at Ubly, Michigan as we said above. The two plants serve eight substations, 98 miles of transmission lines, all 44,000 volts, 1544 miles of distribution lines and the cooperative had 5825 customers as of December 31, 1956.

The consulting engineers for both Ubly and Caro were J & G Daverman of Grand Rapids, Michigan, who were also the consulting engineers for the Wolverine Electric Cooperative at Big Rapids, Michigan, whose Hersey plant has won the DIESEL PROGRESS plaque three times over the last six years. A great deal of credit goes to the consulting engineers for the high quality of the equipment selected for the Caro plant. For instance, the fuel oil filters are Hilco, and at the engines, Nugent. The fuel oil meter, Niagara, and the fuel oil transfer pump, Roper. The lube oil used is HD Sinclair; the lube oil filter again is a Hilco; and the lube oil reclaimer comes from the Hilliard plant in Elmira. The heat exchangers throughout the plant, as might well be expected, are Ross. Air-Maze supplied the air intake filters on top of the roof and right beside the air intake filters you will see the Maxim exhaust silencers. Getting back down in the engine room again, we find the Alnor



The well arranged, well equipped machine shop at Caro, Michigan in which is installed the Merlin centerless grinder at the left, which is used so successfully in maintaining the injection equipment. Then you will notice a very useful lathe, vise, etc., plenty of room to work, plenty of light.

Here is a closeup of one of the Hilco filters of which there are three in the Caro, Michigan plant, one fuel oil filter, one lube oil filter, one lube oil reclaimer.

pyrometers on the control board which was supplied by Kirkhof Electric with instruments by Westinghouse Electric.

One of the interesting parts of this very finely kept plant is the machine shop over in one corner, well lighted, well equipped. You will notice in one of the illustrations the Merlin centerless grinder which has proved so useful down at the Hersey, Michigan plant and other R.E.A. installations. This Merlin unit materially reduces the cost of maintaining the injection equipment on these engines. A great deal of credit goes, of course, to Orville Hurford who is the Manager of the Co-op, but the man who has brought this plant up to prize-winning efficiency is Don H. Decker, the Superintendent, whom you will see as the last man in the operating personnel photograph.

Our congratulations again go out to him and to his hard-working crew—you have to work hard to keep ahead of these other R.E.A. plants in their competition to win this bronze plaque which they take pride in attaching to the front of their building and polishing it like an apple every week.

Picture of the crew who so successfully operate this Caro, Michigan plant—left to right: Orville Hurford, Manager; Warren Sweet, President; Russell West, Maintenance man; Anthony Knoll, Earl Boitel, William Schultze, Merrill Hagen, Operators; and Don H. Decker, Superintendent.

POPLAR BLUFF WINS AGAIN

THE M & A Electric Power Cooperative (Missouri 60), classified in Division B of our contest, has again won the DIESEL PROGRESS award for the most efficiently operated internal combustion R.E.A. plant in the nation in 1956.

Four identical Cooper-Bessemer engines, each rated at 3300 hp, were in service from 6,000 hours to 7,500 hours during the year. They produced a combined total of 61,781,000 kw/hrs. In order to meet consumer demand, all four engines carried an overload as much as 19 hours a day, every weekday, month after month.

But output volume is by no means the major distinction of this plant. Primarily, it is notable for the planned efficiency of its operation—a determination on the part of Manager James W. Owens, Jr., Plant Superintendent Howard W. Clutts, and every member of the operating staff to get peak performance from their equipment. The plant is recognized of course, for production economy, as the DIESEL PROGRESS award attests, and achieved a total production cost, including overhead, of just 5.094 mills per net kw/hr, which is a material improvement over the record this same plant made of 6.41 mills per net kw/hr when it won the DIESEL PROGRESS plaque for the first time in 1954.

It is notable also as the first installation of Cooper-Bessemer's three-way engines which operate with diesel-cycle efficiency as a straight oil-burning engine, as a dual-fuel engine using natural gas with oil as a pilot fuel, and finally as an electric-ignition straight gas engine. This provides a high degree of flexibility and permits M & A's prudent management to utilize the most advantageous fuel at all times. Natural gas is the cheapest fuel and is used with electric ignition in two of the engines during the six months of the year when supplies are most certain. Then, when cold weather approaches, giving the supplier the contractual right to cut the plant off the gas line, the four gas engines are converted to dual-fuel.

Let's take a look at the prize plant. The four engines are Type LSV-16-GDT/SG Cooper-Bessemers, a 16-cylinder, V-type, supercharged unit of 15½ in. bore and 22 in. stroke, conservatively rated for this installation at 3300 hp at 327 rpm. This rating is at a specified bmep of 120 psig. The same engine has operated successfully at a bmep of 150 psig, which gives it a rating of 4120 hp at the same 327 rpm. Each engine drives a 2939 kva, 3-phase, 60-cycle, 4160 volt Ideal Electric alternator with 30 kw, 125 volt exciter.

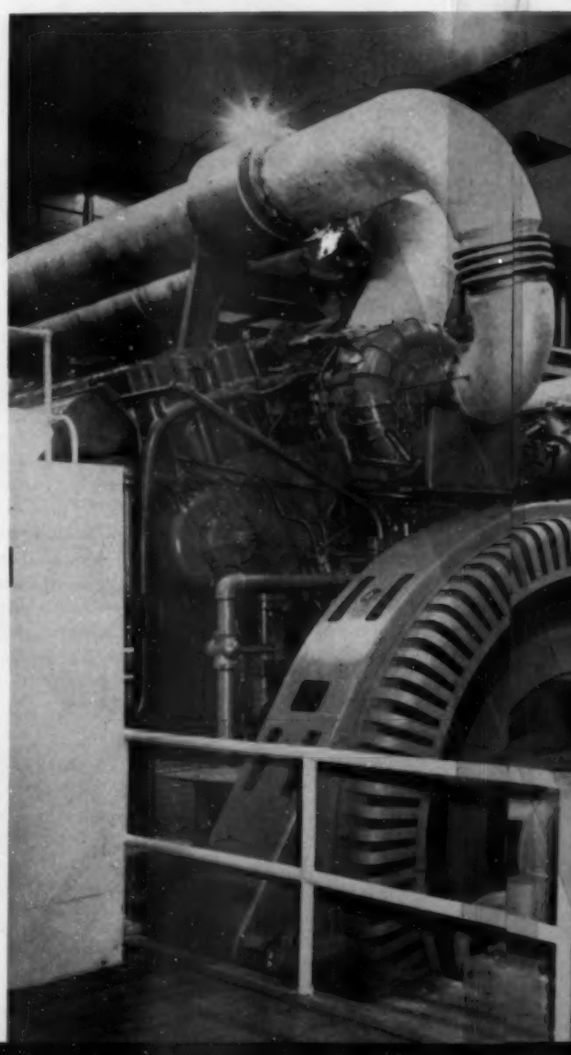
A detergent-type lubricating oil is purchased in tank-car lots and stored in a 9000 gal. underground tank. A 10 gpm pump transfers makeup lube as needed through a meter to the individual engine sump tanks. Lube oil is circulated through each engine by a 450 gpm pump driven by a 20 hp electric motor through reduction gears. Included in the full-flow system are a duplex and a shell-and-tube oil cooler. Oil temperature is kept at prescribed temperature automatically by motor-operated butterfly valves which bypass spray water around the cooler as necessary. The valve operation in turn is controlled by a potentiometer on a guage and operating panel beside each engine; thus lube temperature can be set and maintained from the control panel.

The oil is tested every 600 hours with a test kit to determine viscosity, acidity, water and bottom sediment, and carbonaceous material. Every three months, a sample is sent for thorough laboratory examination by the oil company. The oil invariably is reported to be in very good condition. Cooling water for each engine is circulated through engine jackets and a shell-and-tube heat exchanger by an 830 gpm centrifugal pump driven by a 15 hp motor. Piping is arranged so that any pump can serve any engine. Another four 830 gpm centrifugals, driven in this case by 20 hp motors, send spray water from the cooling tower sump through the lube coolers and jacket water heat exchangers to the sprays of a forced-draft cooling tower built in two sections which can be operated independently. Each tower section has a 6-blade 144 in. fan.

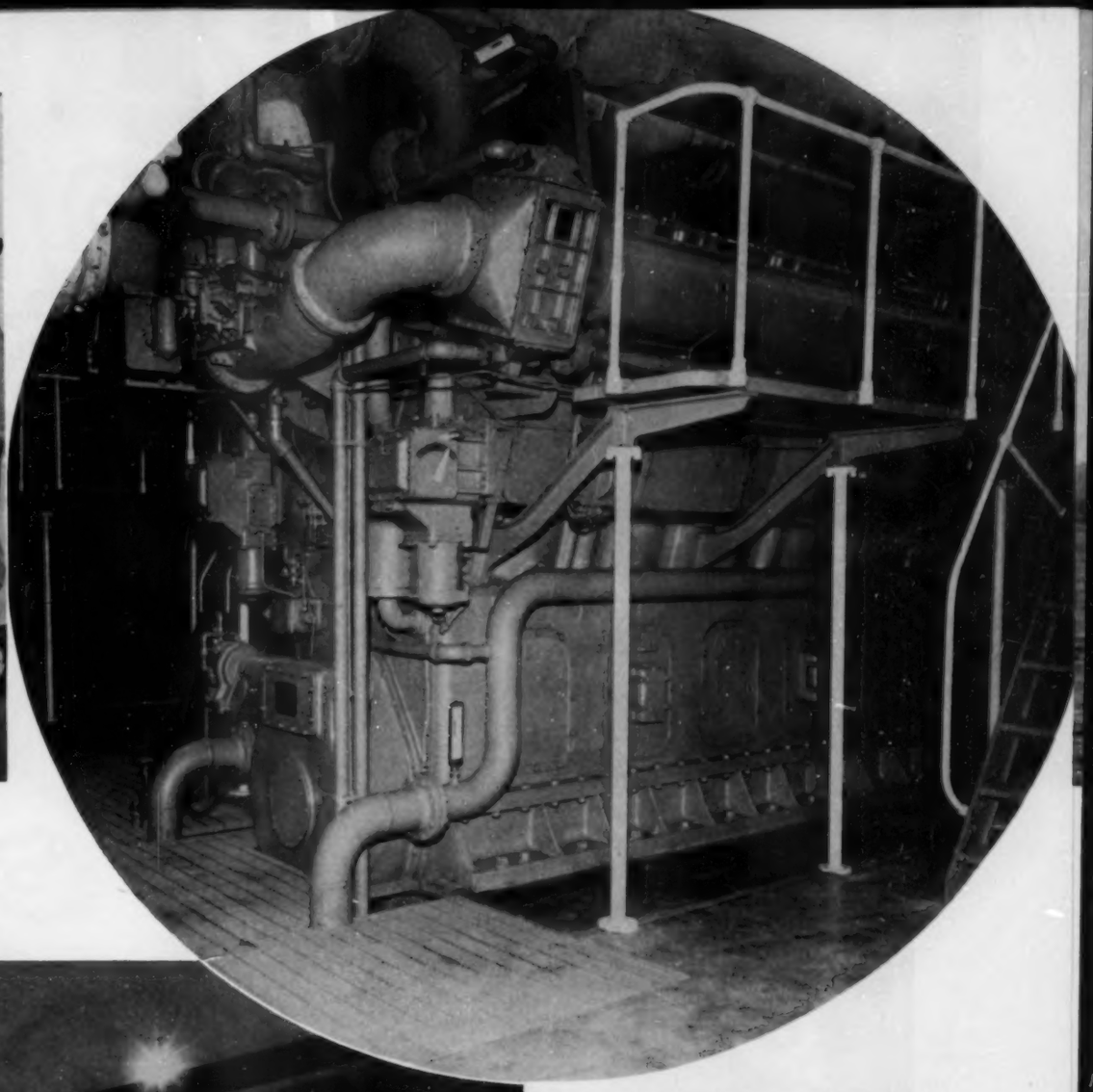
Temperature control is flexible and convenient. In response to a potentiometer setting on the panel near the engine, motor-operated butterfly valves bypass spray water around the heat exchanger to maintain jacket water at the prescribed temperature. The tower fans can be started, run at either speed or stopped from push-button controls in the engine room. As many of the raw water pumps can be pressed into service as the cooling load requires, again from controls in the engine room.

Ambient temperatures are high during the summer months. Tests conducted in August showed air going into the superchargers at 104°F, coming out at 154° to enter the aftercooler, then out to the header at 134°. July and August are the peak production months and the engines comfortably carried an over-load on the hottest days. In winter, the aftercoolers serve to raise air temperature. After leaving the turbochargers, the exhaust gases vent through vertical silencers at the rear of the plant. Starting air for the engines is supplied by a pair of vertical air compressors belted to 15 hp motors. Air in the header and the four storage tanks is kept automatically at 250 psig. Gauge, meters and controls are arranged so that the operator can check operating conditions and control accessory equipment without leaving the engine room and the adjacent switchboard room. Beside each engine is a panel holding pressure gauges on jacket water, lube, gas, turbocharger lube, fuel, starting air, engine air, alarms on water, gas, lube and fuel pressure, water and lube temperature, fuel day tank level, push-button controls for air filter, lube pump, fuel booster pump, jacket water pump, lube filter pump and lube filter heaters. There is also an exhaust pyrometer with selector switch, a voltmeter and ammeter on the ignition system and an ignition voltage test button.

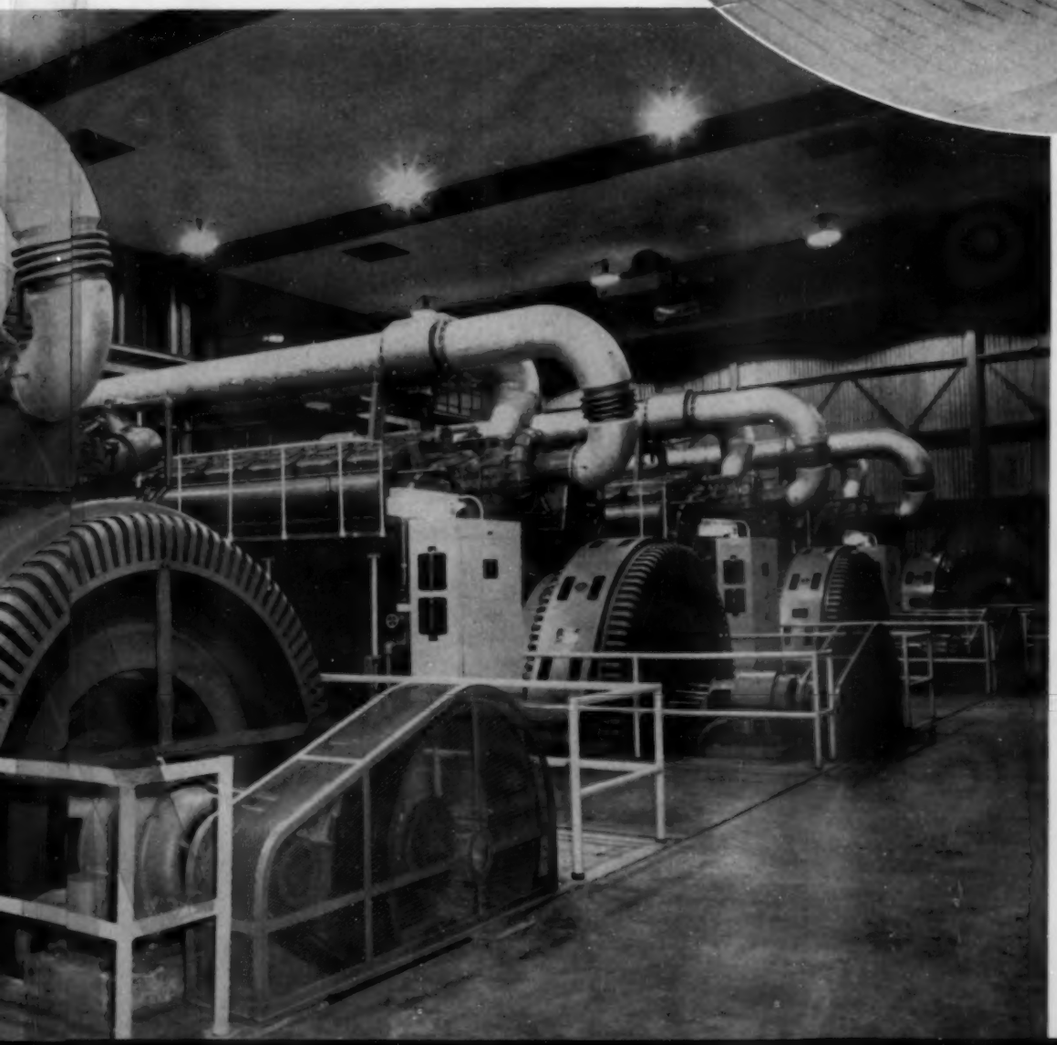
The winning crew, seated left to right: E. F. Singleton
Frank Anthony; Ward L. Crabtree; Barney Rommel; s
Owens, Jr., Manager; Howard Clutts, Plant Superintend
Roy Powers, Gene Albritton, and C



E. F. Singleton; Frank Smody; Gene Wright; rney Rommel; standing, left to right: James W. lant Superintendent; Ollie Berry, George Milner, Albritton, and Carter Ponder.

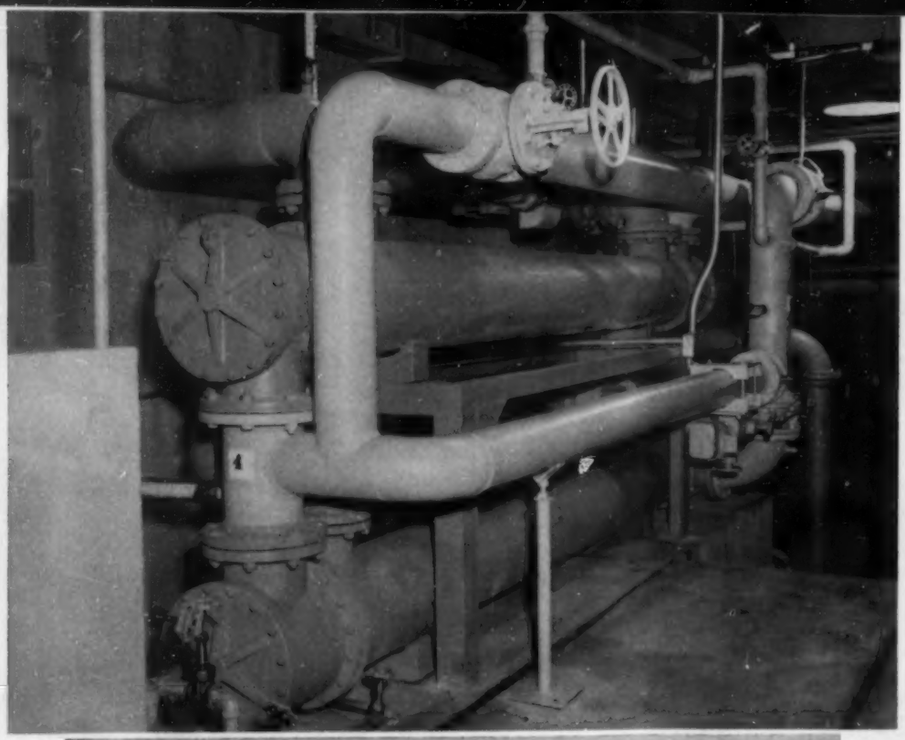


The Cooper-Bessemer engines are rated at 3300 bhp at 327 rpm at a bmep of 120 psig. The same units are in service in some installations at 150 bmep which permits a rating of 4120 bhp at the same rotative speed. This view of the engines shows the superchargers that serve the bank of 8 cylinders at right, the Young after-coolers and Purolator fuel filters.



Prime movers in the Green Forest plant are these four identical type LSV-16-GDT Cooper-Bessemer three-way engines capable of running on oil, natural gas or a combination of the two fuels. This picture also shows the Ideal Electric alternators and exciters, Woodward governors, Elliott turbochargers and Air-Maze intake silencers.

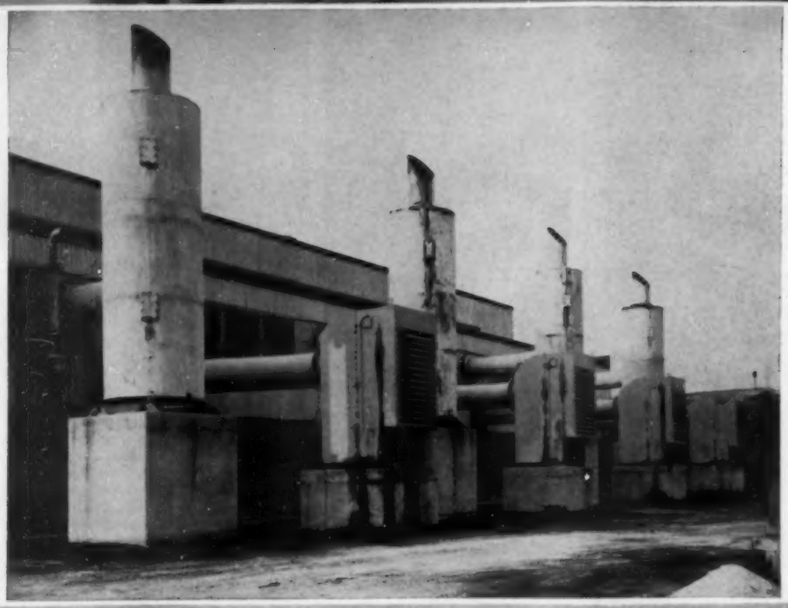
M & A engineers know that good operating is just as important as good equipment and have organized a meticulous preventive maintenance program. The schedule book lists the parts and equipment to be checked and the interval between servicings. To pick just a few at random: air filters are checked at 1000 hours, governors at 4000 hours, main and connecting rod bearings at 6000 hours, lube pumps at 7000, cylinder liners at 8000, heat exchangers and aftercoolers at six months, lube filter pumps annually. The full list covers everything in the plant. There is an individual card for each part or piece of equipment and notations are made on each job done and the condi-



For each engine there is a Ross lube cooler and a Ross jacket water heat exchanger. This picture also shows the Automatic Temperature Control thermostatic bypass valve at the far end of the exchanger.

tion of the equipment. In addition, the plant makes out an "out of service report" when a major piece of equipment is taken out of service for maintenance. A copy indicating the job to be done is sent to the office when the equipment comes off the line and a second report with the same job number goes to the office when the repair is completed.

M & A Manager Owens credits Plant Supt. Clutts, Chief Engineer Ponder and the plant operating staff with major responsibility for the efficient operation of the Green Forest plant. No organization could achieve M & A's success record without wise and energetic officials at the level of policy supervision. In the case of this R.E.A. Cooperative, many of the present officers and directors were prime movers in the creation of the co-op and play vital roles in its continuing growth. The officers and directors are: President Elon Proffer, Vice President Earl Walden, Secretary Alva Wilfong, Treasurer Roy Creek, Directors Frank Paullus, L. L. Bryan, and Avon Knight.



Engine air is drawn through multi-duty, self-cleaning American Air filters. Exhaust gases vent through Maxim silencers.

List of Principal Equipment

Engines—Four type LSV-16-GDT-SG, 15½x22 in., 327 rpm, 3300 hp "three-way" engines. Cooper-Bessemer.
Alternators—Four Type SAN, 2939 kva, 2351 kw, 3ph, 60-cycle, 4160 volt 80% pf. Ideal Electric.
Exciters—30 kw, 125 volt. Ideal Electric.
Governors—Woodward.
Fuel heat exchanger—Ross.
Day tank level alarm—Mercoid.
Fuel filters on engines—Purolator (duplex).
Overflow fuel drain tank meter—Liquidometer.
Piston rings—Pedrick and American Hammered.
Lube oil—Dieselmotive Oil B, Gulf Refining.
Lube tank level gauges—Liquidometer.
Oil coolers—Ross.
Water heat exchangers—Ross.
Air filters—American Air.
Intake silencers—Air-Maze.
Exhaust-driven turbochargers—Elliott.
Aftercoolers—Young Radiator.
Exhaust silencers—Maxim.
Starting air compressors—Gardner-Denver.
Pump motors—Ideal Electric.
Consulting Engineers—Stanley Engineering Co.

M & A Manager, James W. Owens, Jr., (standing right) discusses problems with the Cooperative's operating executives. Seated, left to right: Alva Wilfong, Secretary; Earl Walden, Vice President; Carl Williams, Manager Pemiscot-Dunklin Electric Cooperative; Elon Proffer, President; Roy Creek, Treasurer; Frank Paullus, Director; L. L. Bryan, Director; Standing, left: Harold Treasure, Attorney.

Extra-heavy scantlings and a hull displacement of 40-long tons have been included in the custom-built *Scelp* to provide excellent off-shore seagoing qualities.

DIESEL YACHT *SCELP*

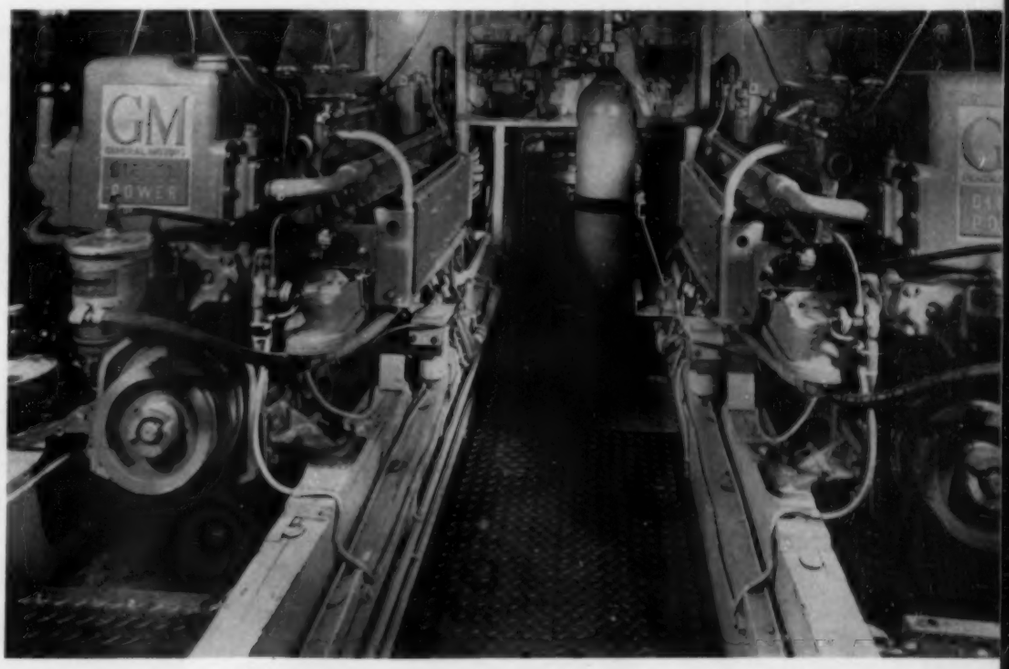
By DOUGLAS SHEARING

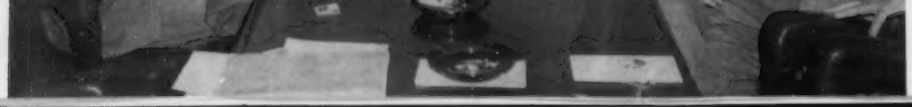
THE *Scelp*, a 68-foot diesel-yacht delivered early last year to Mr. C. A. McAleenan of Guilford, Connecticut provides an excellent demonstration of the speed with which American builders are today turning out custom-built craft. The craft, designed by Eldredge, McInnis, Inc. of Boston, and built by the Quincy Adams Yacht Yard, Inc., of Quincy, Massachusetts was complete and ready for trials within a brief period of 90 days. In fact, the McAleenans were cruising Florida waters months ahead of a completion date heretofore considered normal for a craft of her size and appointments.

Contributing to gracious living aboard the *Scelp*, which has a beam of slightly over 16 feet, is a large deck salon, spacious sundeck and semi-enclosed bridge. The galley is equipped with gas range, refrigerator, deep freeze unit and plenty of space for supplies. Aft is the owner's double stateroom, two guest staterooms with shower and toilets. Forward is the captain's stateroom and quarters for a crew of two with dinette and toilet. Power for the craft is provided by two 6-71 GM Detroit diesel engines supplied by the Hubbs Engine Company of Cambridge, Mass. The diesels turn two 30 in. x 22 in. wheels through two to one reduction gears and the craft has a cruising speed of 12 nautical miles per hour. Bridge equipment includes Raytheon fathometer, Apelco radio direction finder, Bendix automatic pilot, Morse controls and Pierce-Simpson ship-to-shore telephone.

The craft is beautifully appointed throughout and is a tribute to the American boat builder not only because of her speedy construction and delivery but also because of the excellent workmanship apparent from keel to bridge. Aside from their recent trip to Florida most of the McAleenan's cruising is done in Long Island Sound and neighboring waters. They are members of the New York, Cat Key, Montauk and Sachem's Head Yacht Clubs.

Two 6-71 GM Detroit Diesel engines provide power for the craft, which has a cruising speed of 12 nautical miles per hour.





SLM DIESEL TEST EQUIPMENT

The SLM Engine Pressure Indicator of Swiss Design and Manufacture is Now Marketed in the U.S.A. and Canada by Kistler Instrument Company of North Tonawanda, N.Y.

By DOUGLAS SHEARING

A NEW line of precision test equipment developed specifically for diesel engine applications provides a continuous visual display of cylinder pressures, manifold pressures, fuel injection line pressures, combustion pressure rates, engine vibrations, crankshaft terminal vibrations, valve motion and injector plunger motion. Auxiliary equipment is available for synchronizing time displays, superimposing crankshaft position marks on the pressure diagrams and for displaying traditional indicator card diagrams directly on an oscilloscope screen. A selector switch permits selecting the signal from any one of a number of pickups for display on a single indicator.

SLM equipment makes possible adjusting injection timing and metering fuel according to actual cylinder pressures and combustion rates under operating conditions. This technique takes into account all of the peculiarities of a specific cylinder and fuel injection system. Peak pressures can be simply and easily measured and the load equally balanced among all of the cylinders. Combustion rates, detonation, manifold pressures and engine vibration can readily be checked against normal performance patterns. Improper adjustment or faulty operation can quickly be detected.

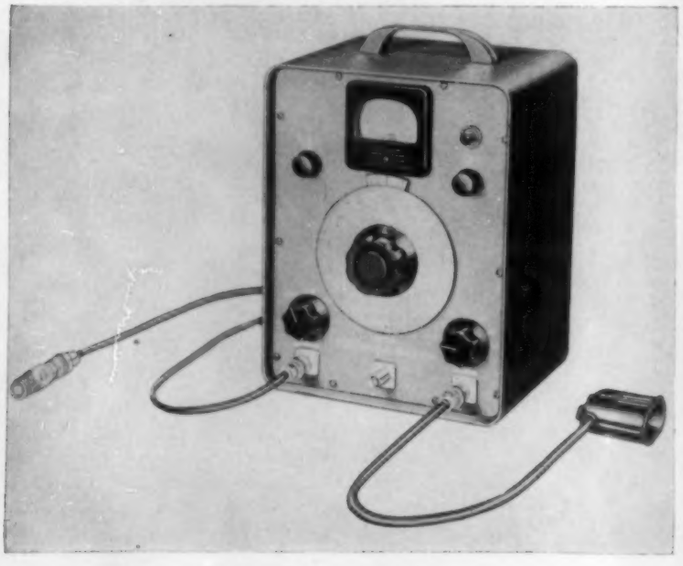
SLM instruments are now in use in engine development and engineering laboratories in both the United States and Europe. At universities this equipment has proven to be a valuable research and educational tool. In addition, the ruggedness and simplicity of the SLM instruments make them suitable for production line, maintenance shop and field applications. With the exception of the oscilloscope, a complete engine test instrumentation system contains but a single electron tube.

All presures, pressure rates, vibrations and forces are measured with the same SLM PZ14 Pressure Pickup. The pickup measures all pressures from 0.1 psi to 3,000 psi. A high pressure adaptor extends this range to 30,000 psi for fuel injection measurements. An accelerometer attachment converts the pickup into a vibration indicator. Special variable capacitance type "electrostatic" pickups are used for measuring piston displacement, crankshaft torsional vibration, and injector needle motions. Magnetic or photo-electric pulse pickups are used for generating synchronizing and phase pulses for testing purposes.

The SLM Pressure Pickup—No special air or water cooling of the SLM Pressure Pickup is required even for cylinder pressure measurements on air cooled diesel engines. Its crystal transducer can be calibrated by conventional static methods on a dead weight gage testor. In addition, the calibration factor is independent of time, temperature, or mechanical and thermal stresses encountered during installation and operation. The basic accuracy of the pickup is better than one percent. For small engines and ports, a subminiature pickup is now being developed which will be in the form of a pressure probe only one-quarter inch in diameter. SLM Quartz Pickups measure directly either pressure or rate of change of pressure, depending on whether the electrical charge or electrical current generated by the crystals is measured.

The Kistler Piezo-Calibrator—All SLM quartz crystal and electrostatic type pickups require an amplifier with a very high input impedance to convert the electrical charge type signal from the pickup into a voltage signal that can be fed into a standard oscilloscope. The Kistler Piezo-Calibrators incorporate this feature and also contain precision calibration circuiting which is utilized to (1) calibrate the pickup, (2) adjust the oscilloscope sensitivity and (3) to evaluate results obtained by measuring amplitudes.

SLM pressure indicator attached to Kistler Piezo-Calibrator.



SLM piston displacement indicator connected to the Kistler Piezo-Calibrator.

The SLM Engine Pressure Indicator, a standard oscilloscope and a pulse pickup is required for cylinder pressure-time diagrams. The pulse pickup, which generates a pulse at certain flywheel positions, is used to externally trigger the linear sweep in the oscilloscope. For best results the pressure pickup should be mounted nearly flush with the combustion chamber walls. If a connecting passage is used, it should have a smooth contour to the end of the pickup—preferably tapering down and then flaring out at the pickup. This passage design will tend to minimize pressure vibrations caused by the passage itself. Detonation is generally followed by a series of similar pressure waves set up in the combustion chamber.

Peak pressures are measured by turning the calibration dial and pushing the calibration button until the base line is moved level with the peak pressure. The pressure difference between the base line and the peak pressure is read directly off the dial. A snap action switch trapped by a cam on the flywheel can be used in place of the manual calibrate button to automatically introduce a calibration pulse. By means of a selector switch the signal from any cylinder pickup can be displayed using a single Piezo-Calibrator and Oscilloscope. By connecting the pickup signal leads together the sum of the signals is obtained. If cylinders are chosen with the proper firing relationship and the signals added, peak pressures in a number of cylinders can be shown simultaneously on the oscilloscope.

Crankshaft position marks can be superimposed on the pressure diagrams by generating pulses with a photo electric or magnetic pickup in close proximity to the flywheel, which has a notch or white paint line on it. The resulting pulse or pulses are introduced in the Piezo-Calibrator through a capacitor connected to the external calibrate terminal. By switching the amplifier to a more sensitive range, any portion of an overall cylinder diagram can be magnified as much as a thousand times.

For cylinder pressure volume, The SLM Piston Displacement Indicator is needed in addition to the Pressure Indicator for indicator card type displays. The horizontal motion of the oscilloscope beam is driven by the PDI signal instead of being a linear sweep externally triggered. The SLM Piston Displacement Indicator features (1) a signal amplitude independent of speed, (2) almost infinite resolution, (3) static calibration and (4) a phase adjustment for switching cylinders or for out-of-phase displays. The PDI Pickup attaches directly to the engine shaft and provides a signal proportional to piston position.

The same SLM PZ 14 Pickup is used for manifold pressure measurements. The amplifier is merely switched to a more sensitive range to measure low level pressures. A special water-cooled adaptor is generally required for exhaust gas measurements. In cases of extreme vibrations and low pressures a simple flexible mount for the pickup using "o" rings is often required.

For fuel injection measurements, a small piston and cylinder type adaptor is fastened to the pressure pickup. This reduces the area exposed to pressure and expands the range by a factor of ten. Only a small hole into the line and a flat surface normal to this passage for the face is needed to mount the pickup. The pickup is then held in place by a shroud ring. Pressure pulsations in the injector line which can cause after-injection can be readily measured with this equipment.

Excessive engine vibrations are generally a sign of either rough combustion, unbalanced loads or a pending mechanical failure. Vibration measurements using the accelerometer attachment and the SLM Pressure Pickup provides an early indication of trouble.

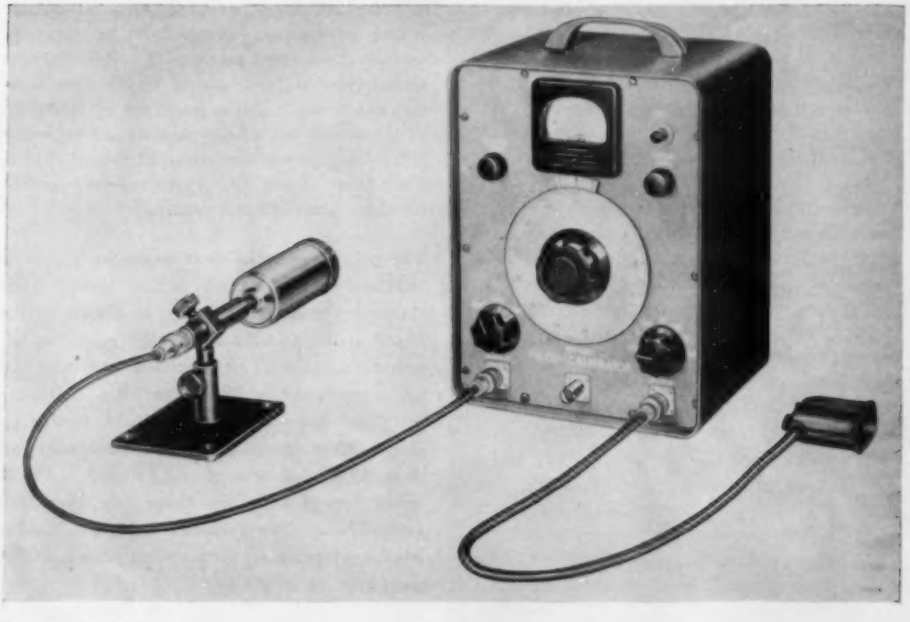
The SLM Torsional Vibration Pickup in connection with the Kistler Piezo-Calibrator and a standard oscilloscope will give a visual indication of torsional vibration amplitudes and frequencies. Critical speeds can thus be determined and avoided. The electrostatic torsional vibration pickup attaches directly to the end of the crankshaft. The signals are directly proportional to the torsional vibration displacement. This instrument is calibrated in quasistatic manner by oscillating it at a frequency above its 2 cps natural frequency over known amplitudes.

For valve and injection plunger motion measurements, a specially designed capacitance type pickup is generally needed. However, the standard Kistler linear motion pickup can often be modified to suit many applications. One plate is generally grounded—this can be an integral part of the injector plunger. The other plate is excited by a dry cell battery and connected to the Piezo-Calibrator input terminal through a capacitor.

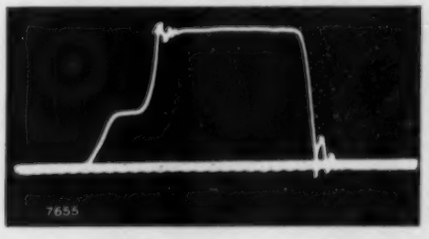
The above examples illustrate the versatility of the SLM Quartz and Electrostatic Instruments. Performance measurements previously limited to engineering laboratories can now be made as a matter of routine in the shop and field. With the SLM Equipment, it is possible to continuously monitor the operation of large diesel engines through cylinder pressure measurements.

SLM pressure indicator unit.

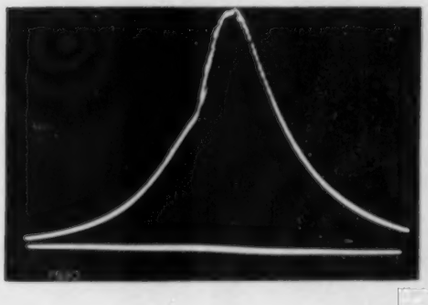
SLM torsional vibration indicator and Piezo-Calibrator ready for operation.



Actual photographic results of injector needle motion measured by SLM instruments.



Photographic results of cylinder pressure — time diagram obtained with SLM instruments.



SEAFORD, DELAWARE

Seaford—Little Plant That Earned A Million. Delaware City Built A Diesel Plant For Power And Profit—And Keeps On Getting More And More Of Both

By WOODROW W. CROSBY*

BACK in 1937, the citizens of Seaford, Delaware, decided that a municipal power plant could meet the electrical needs of the community, maintain prevailing rates, and still yield profits for civic betterment. It isn't likely that many realized what a precocious infant they were nurturing when they put their new plant with its three 300-horsepower Fairbank-Morse diesels on the line that year. The little plant has grown and grown and, through the years, has earned net profits totaling more than a million dollars. Both the nature of the physical growth and the method of handling finances are interesting. In 1939, just two years after the diesels went to work, the building was expanded to permit installation of an 875-hp Model 33D16 Fairbanks-Morse engine and additional room was then provided for still another unit. That was the last expansion of the engine room but only the beginning of the growth in plant capacity. In 1947, a 1200-hp Model 33F16 F-M diesel was put in the last open space, bringing the plant up to 2,975 horsepower.

Since that date, the Seaford plant has nearly doubled its capacity without enlarging the engine room. In March 1951, a 1,600-hp Model 38D8-⅛ Fairbanks-Morse opposed-piston engine started grinding out power on the spot previously occupied by one of the original 300-hp units. An even more striking demonstration of the power and compactness of the opposed-piston design came in September, 1954, when a 1,920-hp unit set up shop in the space vacated by another of the 300-hp engines. This brought plant capacity to 5,895 hp, a gain of more than 98 percent. And there is still room for another powerful OP where the last of the original engines sits. The hoped-for profits materialized and grew with the plant. This reporter dug up figures back through the fiscal year ended January 31, 1940, and found a net profit *(after* depreciation) of $29,187.85. By 1945, the profit was up to $43,144.67; in 1950, it reached $71,905.96; and in fiscal 1956 topped $100,000 for the first time, soaring to $101,981.01. Table I shows that the plant earned in 17 years the total of $1,093,363.92. This net profit is calculated after deduction of all costs of production and distribution including reserve for depreciation.

It was the original intent to utilize these profits for civic improvement and this has been done. In just the last four years, the plant has turned over to the City $232,000 for expansion and improvement of the water system and sewage disposal system, and for purchase of a fire truck. But Seaford knew better than to bleed the source of these blessings. Definite provision was put into the City charter to insure the plant ample funds for necessary expansion and improvement and for replacement of worn or obsolete equipment. The Charter says: "The City Council of Seaford is hereby enjoined to set aside twenty-five percent of the gross receipts of the municipal light and power plant as a reserve fund to be held in trust and to be used solely for the erection of a new plant or some addition to the existing plant, or for the replacement, expansion, rebuilding, or improvement of the municipal light and power plant at Seaford; provided however, that after the said reserve fund shall have reached the amount or value of $200,00.00 in hand, it will no longer be mandatory to continue to add to the reserve until the reserve again falls below the figure." A similar provision set up a $100,000 fund for the electric distribution system.

With these mandates in the Charter, the plant is always in a position to purchase the equipment it needs to do its job well. Despite the recent expansion, the plant is completely free of debt and, as of the start of the current fiscal year, showed a total of $316,350.89 in the Plant Improvement Sinking Fund and the Transmission System Reserve Fund. The source of all this money for plant improvement and contributions to the City is a smooth-running, efficient diesel power plant, producing an ever-increasing volume from year to year. The fiscal year ending in 1952, with the 1600-hp OP in service part of the time, saw a production total of 6,098,100 kw hrs. The 1920-hp OP was in substantial production in fiscal 1955 but it was the next year that the two newest engines really flexed their muscles. In the year ended January 31, 1956, the 1600-hp unit generated 3,188,000 kw hrs and the 1920-hp engine 4,300,900 kw hrs, two-thirds of the plant total of 11,199,000 kw hrs.

The two OPs fit neatly into the plant's operating pattern, serving as the base load units, but actually every engine in the plant is called on to serve every day but Sunday. The 1920-hp diesel normally runs from 7 a.m. till midnight with the 1200-hp and 300-hp engines helping as needed. On a particularly hot or cold day, load is higher and the 875-hp unit replaces the 300-hp. About midnight, the 1600-hp engine takes over the base load duty with help as required from the 1200-hp, 875-hp or 300-hp units. Peak load hit 2880 kilowatts last winter and promises to equal or exceed that level this summer. The balancing of summer and winter loads has been a healthy development at Seaford. The combination of three power-consuming feed mills and the growing use of air conditioners has built summer load and provided better utilization of plant capacity. The mill load is not without its problems. The largest of the mills, which pulls 500 kw, comes on and off the line without warning and the plant has to keep enough reserve capacity on the line to handle the load when it hits. Naturally, this cuts operating engine load factor with some loss of efficiency. In spite of this, the OPs record respectable fuel economy. For example, up to the start of the current fiscal year, the big engine produced 5,491,900 kw hrs while consuming 415,330 gal. of fuel, an average of 13.22 kw hrs per gallon of fuel.

This community in central Delaware is out of reach of the natural gas pipelines and has to subsist on the more expensive fuel oil. Fortunately, the plant is located on the Nanticoke River and can receive fuel by barge. Installation of a 150,000-gal. verticle, cylindrical steel storage tank permitted fuel purchase in 125,000-gal. barge loads and saved enough on fuel costs in a single year to pay for the tank. From this tank, the fuel flows by gravity to 15,000-gal. and 25,000-gal. horizontal storage tanks and then is transferred by automatically-controlled pumps to the individual engine day tanks. Location on the river also obviates the need for cooling towers. Each diesel has a separate closed cooling system with one motor-driven centrifugal sending water through the engine jackets and a heat exchanger while a second motor-driven centrifugal takes cold water from the river and pumps it through the exchanger and also the oil cooler of the engine.

The detergent-type lubricating oil is checked regularly and kept in good condition. Each OP has a full-flow strainer and a cartridge-type bypass filter with cellulose-packed elements. In addition, the engines are served by a purifier with heater, filtration element and motor-driven pump. After an overhaul or whenever it is felt the oil might be contaminated, lube is drawn from the engine base, filtered and either returned to the engine or sent to a storage tank. Lab analysis of oil is made every 1,000 hours. Seaford believes in preventive maintenance and the engines are inspected carefully every 500 hours. The 1600-hp OP got its first overhaul at 9,265 hours and Chief Engineer Chester Willen reports that pistons, liners and bearings were all in excellent condition. There was almost no liner wear and the wear on the aluminum bearings was so slight that it could not be measured. In preparation for a heavy summer of service, the 1920-hp engine was overhauled in March, 1956 at 6,122 hours. Again Mr. Willen reports excellent condition and negligible wear.

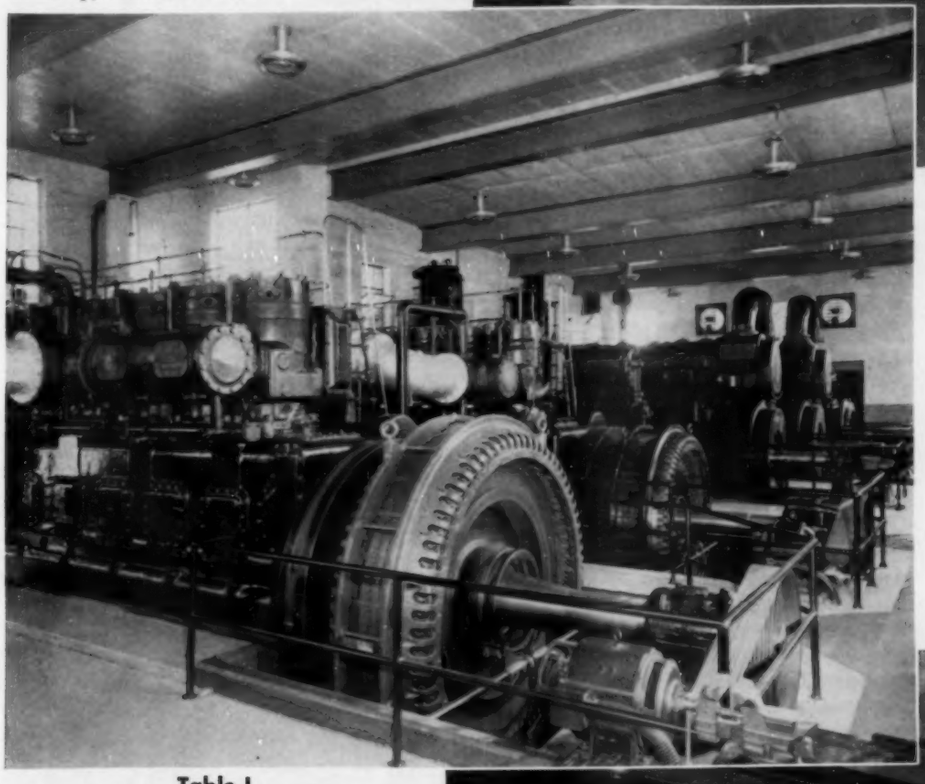
The municipal utility is managed by Woodrow W. Crosby who also serves as City Manager. Mr. Crosby is a manager who knows his diesels, having served at the power plant before moving to the administrative post. All operations are under the policy supervision of Mayor Randall A. Larrimore and Councilmen Morris H. Hitchens, George H. Culver, R. Hayman Lank, Anna May Marvel and John W. Kindell. Seaford calls its municipal utility the Seaford Light and Power Company which makes it sound like a business enterprise. That is not inappropriate for certainly this plant has been good business for the city.

City Manager Seaford, Delaware

Equipment Serving Opposed-Piston Diesels

Seaford, Delaware

Engines	Fairbanks, Morse & Co. (1) 1920-hp and (1) 1600-hp Model 38D8-⅛ 720 rpm opposed-piston diesels with alternators.
Governors	Woodward
Lube oil	Pure Oil
Lube strainer	Air-Maze
Lube purifier	Honan-Crane
Fuel filters	Nugent
Air filters	American Air Filter
Intake silencers	Maxim
Exhaust silencers	Maxim
Exhaust pyrometer	Alnor



In the 17 years since 1940, the Seaford, Delaware, municipal power plant has earned for the city a net profit of over a million dollars.

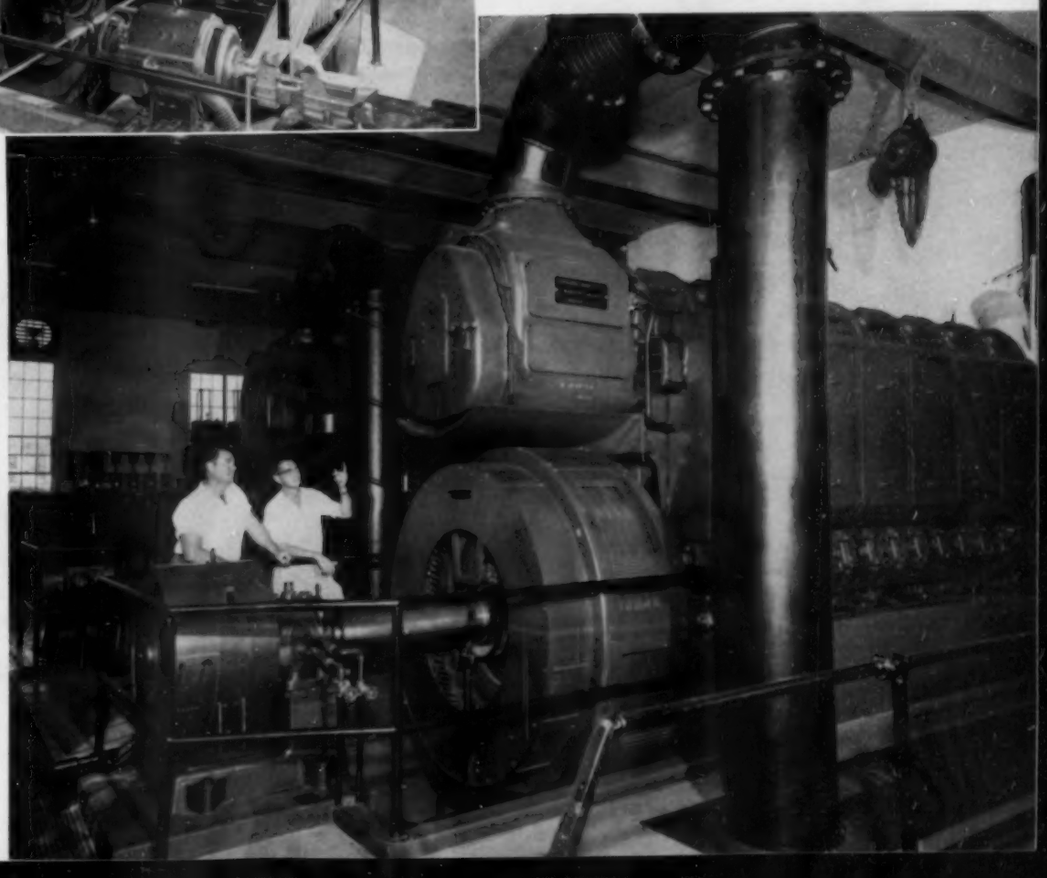
Today, five Fairbanks-Morse diesels carry the plant load which in the year ending January 31, 1956 totalled 11,159,000 kw hrs.

In the year ending January 31, 1956, this 1,920-hp. F-M opposed-piston diesel generated 4,300,900 out of a plant total of 11,199,000 kw hrs.

Table I

Seaford, Delaware

Year Ended January 31	Net Profits
1940	$ 29,187.85
1941	28,724.98
1942	35,247.93
1943	36,832.20
1944	38,323.92
1945	43,144.67
1946	47,926.32
1947	67,205.93
1948	72,276.64
1949	60,241.19
1950	71,905.96
1951	86,361.10
1952	90,000.18
1953	95,151.83
1954	96,247.10
1955	92,605.11
1956	101,981.01
Total	$ 1,093,363.92



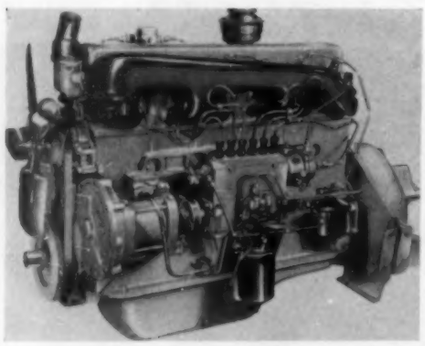
WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C., Ltd., Southall, following which he served some five years with that company's sales engineering department. He entered technical journalism as assistant editor of "Gas & Oil Power" in 1950 and was appointed editor in 1952.

Vauxhall Motors First Diesel

Bedford commercial vehicles are manufactured by Vauxhall Motors Ltd., of Luton, who are part of the General Motors group of companies. For many years now, the Bedford range has been available with either petrol or diesel engine units, the diesels being either of Perkins or Leyland make according to the vehicle size. Vauxhall Motors have now announced an entirely new 90 hp Bedford diesel engine which is in production at a new factory in Dunstable. The engine has six cylinders of 3⅞ in. bore by 4¼ in. stroke and has the same major proportions as the company's well-established 300 cu in. petrol engine. Its designers emphasize, however, that the new diesel is in no way a conversion of the petrol engine, but by the adoption of a similar bore and stroke and cylinder centre distance for both 300 cu in. engines it has been possible to standardize a large proportion of the very expensive machine tools.



As further evidence that the diesel engine is in no way prejudiced, it is pointed out that certain major changes have taken place in the petrol engine to permit the standardization process. The new engine is a vertical four-stroke design and injection is direct into toroidal combustion chambers formed within the piston crown. The injectors are of the four hole nozzle type and are located in the cylinder head at an angle of 20 degrees. They are positioned between vertical intake and exhaust valves and the cylinder head is sleeved through the water space to carry the injector. By this means effective injector cooling is obtained, head casting problems are simplified and it is possible to accommodate valves of the maximum size within the bore size.

A conventional C.A.V. fuel injection pump of the in-line type is mounted on the side of the engine and driven by steel helical gears from the forward end. An exhauster for vacuum brakes is driven in tandem with the fuel pump and the camshaft is driven by helical gears also at the forward end of the engine. The cast timing case carrying the gears for the exhauster, injection pump and camshaft drive is designed also to accommodate a power steering pump to be driven off the camshaft gear. When not needed, machined face is blanked off.

The crankshaft is carried in seven main bearings and is induction hardened on all main and crankpin journals. Lead-indium flashed steel-backed copper-lead bearings are used throughout the engine and the crankshaft fillets are treated by a special roll-peening process to minimise the risk of fatigue cracks. Pressure lubrication is supplied from a gear type pump submerged in the crankcase and driven by helical gears from the camshaft. It also supplies oil under pressure to the four camshaft bearings through drilled holes from the main bearing housings.

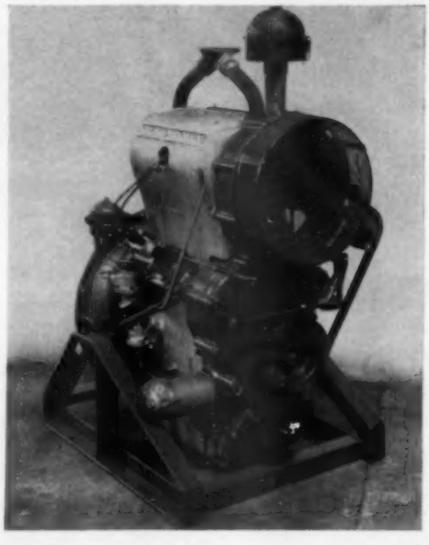
The aluminum pistons have the toroidal combustion chamber machined in the crown and the top land proportions permit very moderate piston ring temperatures with resulting little susceptibility to ring sticking. There are in all, five rings, four being above the piston pin and one below. The top ring is chromium-plated, the lower two rings being of the oil control type.

Over 30 prototype engines of the new design have been field tested and excellent fuel economy is claimed. From over one million miles of road and track tests a full load fuel consumption of less than 0.4 lb per bhp per hour was obtained and under full load durability tests with a gross vehicle weight of 18,400 lb at an average speed of 26 mph, some 135.5 ton miles per gallon was averaged. This is equivalent to over 20 miles per gallon under normal operating conditions.

Small Air-Cooled Industrial Unit

A new two-cylinder industrial diesel engine is now available from David Brown Industries Ltd. It is a compact design rated continuously at 10.5 bhp when running at 1,800 rpm. Its overall dimensions are length, including clutch, 33 in.; width 25½ in.; height 40 in. and weight 504 lb. It is known as the SD2 and is a two-cylinder, air-cooled four-stroke design. The cylinder dimensions are 3½ in. bore by 4 in. stroke giving a swept volume of 1,262 cc, and a maximum piston speed of 1,200 ft/minute.

The cylinder block crankcase and liners are in aluminum alloy with separate cylinder barrels of high grade cast iron. The sump cover also is in aluminum alloy. Tocco hardening is provided for the main and big end bearings of the crankshaft which is in manganese molybdenum steel as also are the H-section connecting rods. The silicon alloy pistons carry one plain compression ring and two stepped rings above the piston pin and one scraper ring below. The alloy cylinder head carries replaceable valve seat inserts together with a copper injector sleeve. The design incorporates tangential inlet ports to create swirl. Valve operation is by push rod and rockers, the valves being 1.3 in. diameter.



The pressure lubricating system incorporates a full flow replaceable paper element oil filter which together with fuel injection equipment is of C.A.V. manufacture. Other auxiliaries include a 12-volt Lucas starter or an inertia hand-starter if required, a 6 in. diameter oil bath air cleaner and mechanical type governor operating throughout the entire speed range of 800 to 1,800 rpm. Engine cooling air is provided by an axial fan driven from the crankshaft by a V-belt drive.

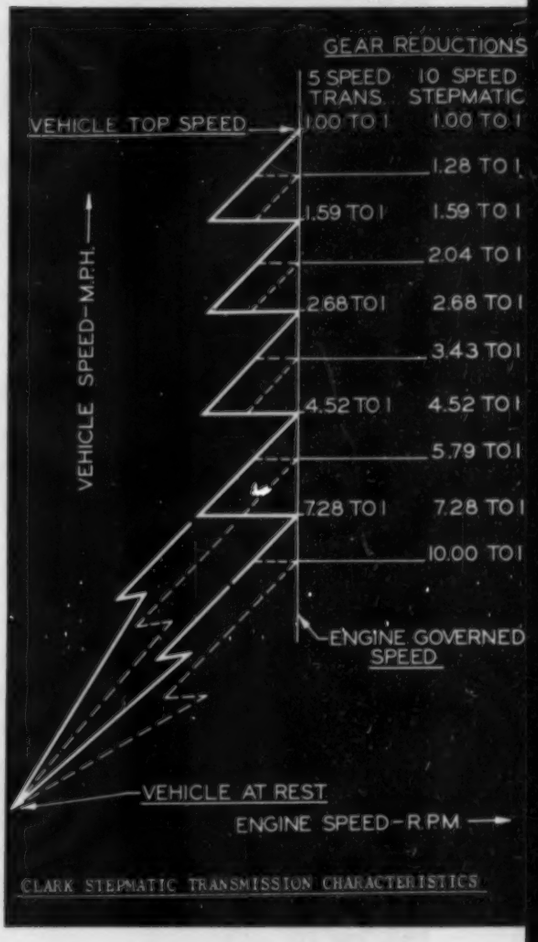
THE STEPMATIC TRANSMISSION

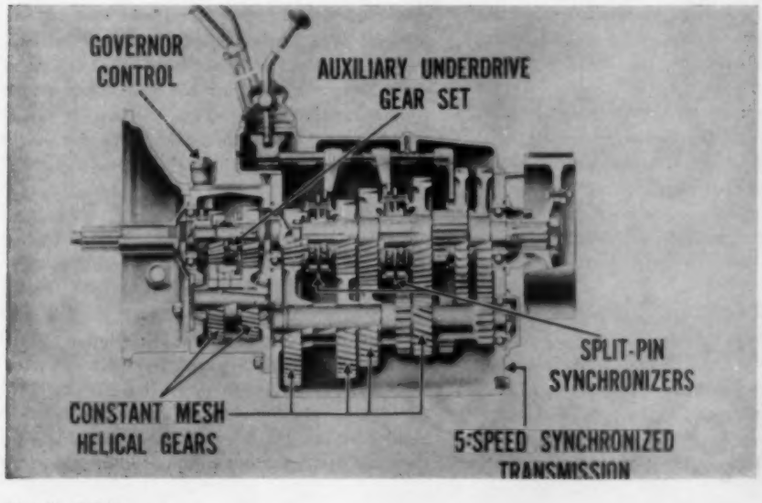
TO fulfill transmission requirements of highway trucks, Clark Equipment Company's Transmission Division has developed the StepMatic, a new semi-automatic heavy duty truck transmission which minimizes shift lever and clutch pedal manipulation and reduces the need for skilled gear shifting. The StepMatic is an integrated combination of a five-speed synchronized transmission and an auxiliary gear train. The auxiliary unit is composed of a direct and an underdrive gear set which are semi-automatically engaged. The underdrive gear ratio splits the geared steps of the transmission. As a result, the StepMatic has ten closely spaced gear ratios. This means that the gear train can be selected for optimum engine operation. On the basis of extensive field testing, Clark engineers report that fuel economy as well as savings in engine and transmission wear are obtained.

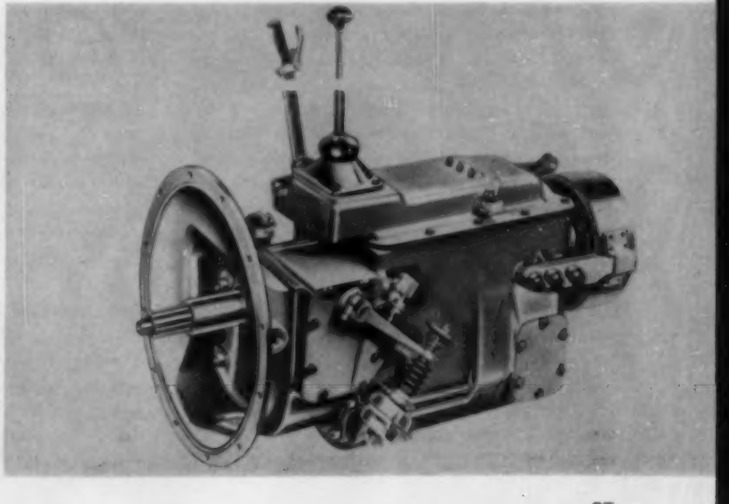
Regardless of the transmission gear in use, the truck driver can obtain additional gear reduction and power immediately by floorboarding the accelerator pedal or by pushing a button on the dashboard or shift lever, as arranged to suit the truck builder's option. This shifts the auxiliary into underdrive and provides additional gear reduction. The auxiliary automatically returns to direct drive when the driver relaxes the accelerator pedal. With StepMatic, the driver does not require a high degree of gear shifting skill to keep the truck high-balling in the face of rapidly changing road conditions. Outstanding features claimed for the StepMatic transmission include simplicity of design and construction, compactness and simplicity of operation. The ten-speed unit is currently available in two sizes, Model 303X rated for engine torque output of 300 lb-ft, and approximately 5-¾ in. longer than a conventional five-speed transmission; and the 400-X, rated for 425 lb-ft torque and 6-7/16 in. longer than conventional five-speed units.

The engagement of the underdrive ratio in the StepMatic transmission is controlled by a speed responsive governor and by a kickdown switch. A right-angle helical gear on the governor shaft is driven by a drive-gear mounted on the StepMatic input shaft. The kickdown switch, which completes or breaks the circuit actuating the shifting mechanism can be mounted on the dashboard, underneath the accelerator pedal or on the main transmission shift lever. At engine speeds at or below idling speed, the StepMatic unit is always underdrive. At increased engine speed, the governor makes contact to complete a solenoid valve circuit. Air or vacuum then actuates a cylinder which compresses a spring to produce force on the auxiliary shift lever. This tends to shift the unit into direct gear. However, the shift to direct does not occur until the operator relaxes the accelerator pedal. This produces the torque reversal which allows the clutching gear to shift into direct. When engine rpm returns to idling speed, the governor breaks contact. This breaks the solenoid valve circuit. The return spring in the cylinder, aided by thrust from the helical sliding gear tends to automatically shift the StepMatic unit into underdrive. This takes place when tooth load on the clutch teeth is reduced, as in normal deceleration. Up to this point, the controlling action of the governor on the StepMatic unit has been described. It takes place within the idling speed range. At high speeds, the StepMatic unit is controlled by the kickdown switch.

When the terrain, traffic or other operating conditions require added gear reduction, the truck driver actuates the kickdown switch. This breaks the circuit on the solenoid valve and the return spring in the cylinder tends to shift the unit into underdrive. This cannot be completed until torque reversal takes place. Instantaneous torque reversal is accomplished by momentarily cutting off the engine fuel supply through action of the kickdown switch. Upon completion of the shift, a remake switch instantaneously restores the fuel supply. Also, the StepMatic preloads itself for the shift into direct, but remains in underdrive until the operator relaxes the accelerator. A reverse lockout switch is provided to prevent an upshift to direct while in reverse gear. When the main transmission case has shifted into reverse gear, a ramp on the reverse rail pushes the plunger in the switch and breaks the governor circuit.







A HEARTFELT TRIBUTE TO EMIL H. LANG

FROM YOUR EDITOR

REX W. WADMAN

Emil H. Lang, President Erie Forge & Steel Corporation this month celebrating 55 years of continuous service in steel making.

STEEL was still an untried forging material when Emil H. Lang started working at Erie Forge Company in 1902. Railroad scrap iron was piled neatly on boards, dumped into a furnace and the resulting red-hot mass was lifted from the furnace to be hammered into shape. Metallurgy, forging techniques, Erie Forge Co. and Mr. Lang have come a long way since those days. Steel now is the predominant ferrous medium. Modern, non-destructive testing methods can detect flaws in metal parts. Erie Forge Co. has become Erie Forge and Steel Corporation, and Mr. Lang has become its president.

Mr. Lang has participated actively in the great strides taken to improve steel and its fabrication. For example, forged crankshafts, connecting rods and steel castings for diesel applications have taken a large portion of the Corporation's steel production. The largest one piece diesel crankshaft ever made, a 12 throw, weighing 46,400 pounds is typical of today's forging production. Today the Corporation makes and fabricates a wide diversity of products . . . steel forgings and castings for maritime and government vessels, diesel engines, compressors, stationary engines, turbine rotor shafts, presses, steam hammers, power plants, cement mills, rolling mills, to name but a few.

Having been General Sales Manager from 1930 to 1946, Mr. Lang participates actively with his Sales Engineers in the field, necessitating a great amount of travel time. His many years of contact with the industries served enables him to be of great help to the field men on tough sales problems. He is always on hand in such emergencies.

In a recent speech before the Rotary Club of Erie, Pennsylvania, of which he is a long time member, Mr. Lang said, "Our firm consists of buildings, machinery and men. All three, of course, are necessary, but the buildings and the machinery, without the men and the know-how which they possess, would not contribute anything. Therefore, permit me to pay tribute to our men who do have the 'know how' and who are conscientious and faithful in the performance of their duties."

Mr. Lang does not play golf, hunt, or fish. He addresses Civic Clubs and is the General Chairman of the $3,000,000 drive for Hamot Hospital in Erie. He is active in United Fund and Cultural Projects in Erie. His family is his wife, daughter, son-in-law and seven year old granddaughter. A typical grandfather in every way. His great enjoyment is taking the family on long drives through the countryside of Northwestern Pennsylvania.

Mr. Lang is known and admired from one end of this huge diesel industry to the other. He has lived with us, suffered with us, prospered with us—personally I, and all of us here at DIESEL PROGRESS have much to thank him for. For instance Erie Forge & Steel Corporation has never missed the insertion of a full page advertisement either in DIESEL PROGRESS or in the DIESEL ENGINE CATALOG since we started publication back there in 1935. We just want Emil Lang to know we appreciate this continuous support.

DIESEL TUG *LING*

By MICHAEL T. PATE

COMMISSIONING of the *Ling* early this year adds the third of the identical extra heavy duty seagoing, all-ocean tugs to the fleet of the G & H Towing Company, of Houston and Galveston, Texas.

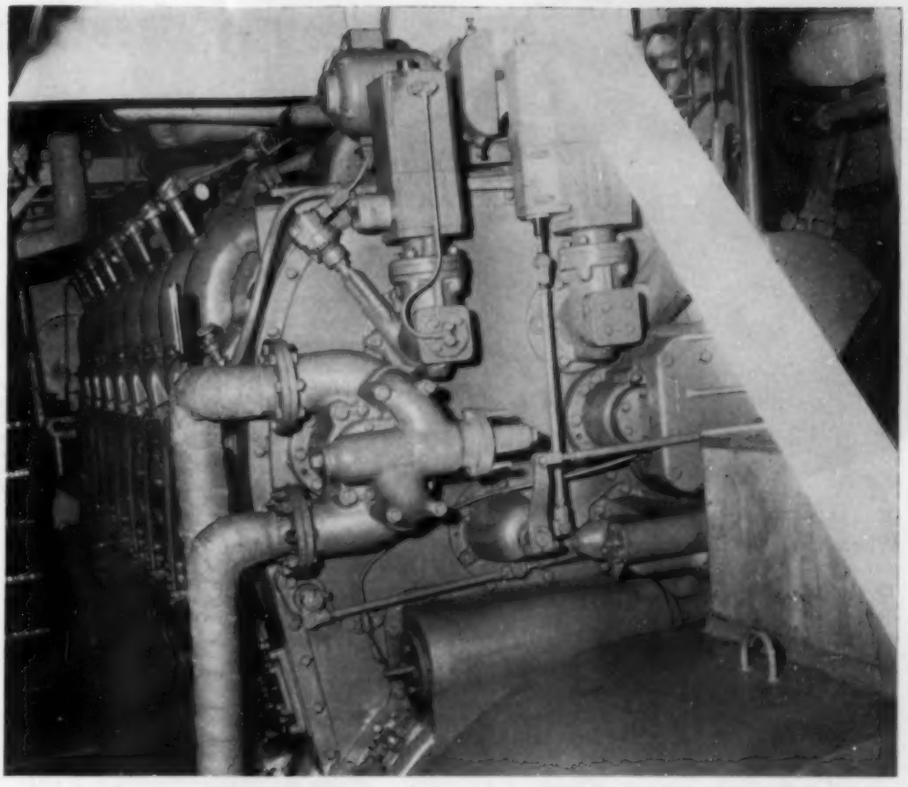
With an over-all length of 105 feet, a beam of 27 feet and a draft of 14 feet fully loaded, the *Ling* is equipped with a single 9-foot 6-inch propeller, driven by a 16 cylinder General Motors Cleveland diesel through a modified Falk reversing and reduction gear.

Two 6-cylinder General Motors diesels, one mounted each to port and starboard abeam of the forward end of the main propulsion engine, are direct-connected to Delco A.C. generators which furnish all auxiliary power for maneuvering, lighting, driving the towing winch, and for the all-electric galley. A third General Motors diesel, mounted abaft the port power unit, is connected to a Stewart & Stevenson generator and provides a third source of electrical energy in case the craft is in port and the power requirements do not demand the output of the larger units.

Immediately ahead of the engine room is a fuel tank, extending the full width of the vessel and serving also as a bulkhead to compartmentalize the hull. This tank has a total capacity of 45,000 gallons of fuel, supplemented by a 1,000 gallon day tank. No. 2 diesel fuel is drawn from the main tank and centrifuged in a Sharples centrifuge before being passed to the day tank. The day tank is centered within the larger unit, with connections so that fuel may be drawn directly from storage if required. A 650 gallon tank serves as storage for the 40 weight lube oil which is used in the diesel. Oil for the refrigeration unit and other special lubricants are stored in drums.

Full wheelhouse control is a feature of the *Ling* type of tug, with the engine-room control panel so equipped that the engineer can also control the engine from his station should occasion require. The three-blade wheel, of bronze, has a 6-foot pitch, and will drive the tug at a speed of approximately 12½ knots, when fully loaded with stores for an extended voyage. With the diesel turning up 750 rpm the Falk gear brings the propeller speed down to 225 rpm.

Normal complement of the *Ling* is a crew of 11, with ample stateroom accommodation for 15. The staterooms, as well as the bridge, galley and other inside space, are fully air-conditioned. The air-conditioning unit is mounted aft of the starboard G-M 671 diesel, and is electrically driven. Current is drawn from the main distribution system, and supplied by either of the 60 kw units in normal operation, although the 20 kw unit has ample capacity to maintain this load if required. Provision for completely air-conditioning the tug adds greatly to the comfort aboard, as the tug is destined primarily for use in the Gulf of Mexico and adjacent waters, although it can be put in service anywhere on the globe, as it can carry a full 30 days' supply of stores and fuel.



Looking down one side of the 1700 hp 16-cylinder General Motors Cleveland diesel which is main propulsion unit for the tug. The diagonal white band across the photograph is a brace for the instrument panel, mounted above the Falk gear. Note Marquette Governors in foreground.

Addition of the *Ling* to the two sister ships, the *Grampus* and the *Pike* gives G & H Towing three 105-foot steel tugs of 1700 hp each—three of the most powerful ocean-going tugs of that length in service—and brings the total of the tugboat fleet up to 22. Designed primarily for the exacting service of furnishing power for maneuvering the offshore platforms used by the oil industry for deep-water drilling, incorporation of the automatic towing winch, with a capacity of 1800 feet of 1¾ inch steel cable, enables the tug to be used advantageously for extended deep-sea towing as well.

The *Ling* completing sea trials before being commissioned by the G & H Towing Company. The 105-foot tug, 27-foot beam, draws 14 feet when fully loaded and has a speed of 12½ knots.

EASTERN DIESEL OBSERVATIONS

A COMMENTARY BY **ARNOLD B. NEWELL**

Arnold B. Newell, a third generation American, was born near Seattle, Washington of pioneer stock. He obtained his engineer's license at 21. Sailed as chief engineer on one of the first ocean-going motorships built in the U.S.A. In 1924 he joined New York Shipbuilding Company in diesel advisory capacity, tested and took to sea New York-Werkspoor diesels, supervised operation of shipyard owned vessels, then in 1927 joined Ingersoll-Rand as diesel field engineer. Became associated with "Motorship" in 1929. Subsequently became managing editor of "Motorship" and "Diesel Power," then vice-president and general manager.

When Thermal Efficiency Exceeds 80%

There is a rule-o-thumb which states that when fuel is burned in a diesel the heat value of that fuel is split into approximately three equal parts, one third becoming power, one third going to waste at the exhaust and one third dissipated via the cooling system. This, of course, disregards losses due to friction and actual mechanical efficiency of the engine. To simplify the point I want to make, I shall use the rule-o-thumb with all its inaccuracies and cite an example of better than 80% thermal efficiency in a manufacturing plant in New England using a diesel, in the 2000 bhp range of power and state as briefly as possible how this efficiency is obtained.

The engine drives an electric generator and its performance in this respect is about the same as other diesel-electric plants. However, the factory it powers requires steam and hot water for heating and processing and oil fired boilers are used for this purpose. They sometimes run a steam turbine to drive a generator and provide extra electricity not generated by the diesel and because vast amounts of low pressure steam are needed. To bring the diesel up to an over all thermal efficiency of more than 80 percent has been a common sense procedure. The engine employs high temperature cooling at 225 deg. F. and corresponding steam pressure. The condenser coolant passes through a heat exchanger which picks up the heat dissipated to the cooling water. This heat, otherwise lost, is sent on its way into the plant as boiler feed. Heat from the oil cooler also goes into the plant system. A conventional combination exhaust silencer and steam generator in the exhaust system generates steam at 7 psi and a specially built economizer then reduces final exhaust gas temperature to about 225° F. before escape to the atmosphere. Hot water taken from the bottom of the silencer-steam generator is circulated rapidly through the economizer and back into the exhaust gas boiler where it flashes to steam at 7 psi and helps to supply heat in the factory.

In this way the only heat losses occur at the extremely low final exhaust gas temperature and the most of what is produced by normal friction in the engine is recaptured through the oil cooler. It has been stated by the chief engineer of this plant that the value of heat recovered from the engine is in excess of the value of the electricity produced by the generator it drives. It seems to me that if other manufacturers who require low pressure steam and hot water for plant heating, manufacturing processes and air conditioning could be made aware of the fact that a diesel is a more efficient heat generator than a steam boiler, there would be fewer boilers with stack temperatures of about 600° F. and more diesels with final exhaust gas temperature around 225° burning the residual fuel so wastefully consumed under boilers. It is my suggestion that sales engineers practice with the slip stick for the purpose of convincing industrialists that the other two thirds of the heat value in diesel fuel need not go down the drain with the coolant or out the exhaust into the wide blue yonder.

The Use of Tubing

The importance of tubing and fittings of the kind in common use is recognized by the majority of engineers. The tubing I have in mind is of several different kinds. Some is solid, some is flexible. The material may be metal of several different kinds or some form of plastic. In one form or another tubing solves many difficult problems of heat, corrosion, high pressure, pulsation, vibration and installation in places that are inaccessible and in other places where threaded pipes would be cumbersome and unsightly. Without going into many gruesome details of all past trouble due to lack of our present-day tubing, one or two incidents are worth remembering. For example, aviation's early attempts to fly the Atlantic were plagued by oil line failures which caused loss of lives and planes otherwise capable of making the flight. In another instance fuel injection lines failed on a government-owned freighter which remained in a South American port while new tubing was made and flown to the ship, giving motorships a black eye. The engines, otherwise perfect were made by one of the best known and highly regarded diesel manufacturers. Still, their reputation suffered badly because of faulty fuel injection tubing.

Today we do not hear of failures in the presence of high pressure on fuel injection lines or the pulsations of pumps in the lube oil systems. The corrosive action of sea water, the high temperature of the exhaust, the expansion and contraction caused by changes in temperature and the vibration of machinery connected to non-vibrating surroundings are all handled effectively with tubing and fittings best suited to meet the conditions which were at one time a constant source of trouble. Tubing and fittings as we now know them not only work effectively and more dependably than threaded pipe but they cost less to install and look better. The occupational hazards they eliminate are numerous. Fires are commonly traceable to oil leaks; unhealthy living conditions are traceable to fumes caused by leaks; power failures of all kinds are likely to cause injury to men attempting to cope with unforeseen stoppages of boats, vehicles, locomotives and industrial plants. It is safe to say that, without the present broad selection of tubing and fittings to meet all the needs of the internal combustion engine industry it would have been impossible to bring diesels to their present state of perfection and dependability in all types of service.

Diesels Around Town

There is an obvious consensus of opinion amongst freight line operators that the diesel belongs on the open highway and the gasoline engine must be used for lugging around town. I have found this to be true in interviews with truckers in far larger numbers than I have written about. I have accepted it as "the voice of experience" but am by no means convinced they are correct. There is ample evidence of erroneous opinion. The Fifth Avenue Coach Lines in New York City has a vast fleet of buses powered by General Motors diesels operating with conspicuous success in a service which demands constant stop-and-go driving. Economy, dependability, excellence of performance and low maintenance costs are responsible for the use of diesels in this service.

In the metropolitan area of New York there is another huge fleet of a different kind fully dieselized. This is the Colonial Sand and Stone Company in which Cummins diesels are used for reasons similar to those mentioned in connection with Fifth Avenue Coach. Yet the class of service is entirely different. The Colonial vehicles move through the city obeying traffic regulations and

And now please turn to page 66

LOAD SENSING GOVERNOR

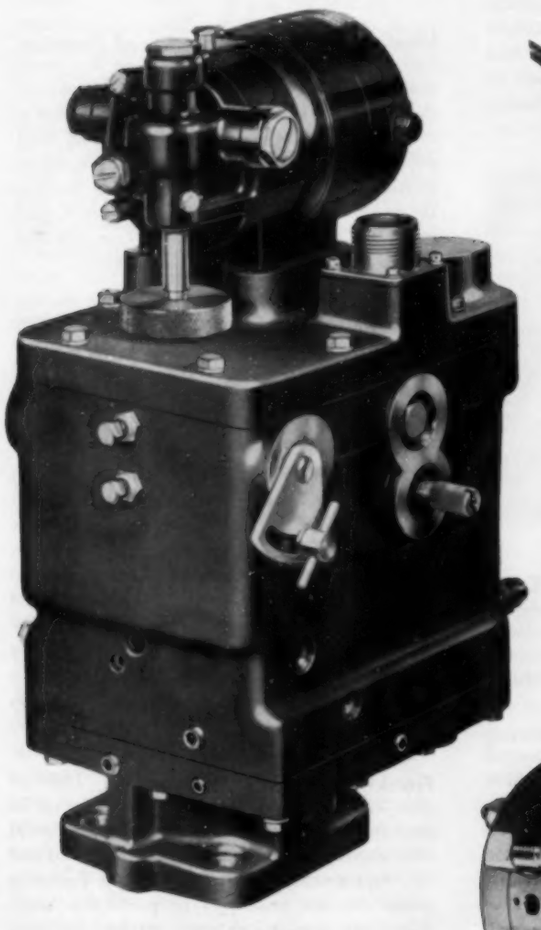
A NEW load sensing governor for engine driven generator sets has been announced by the Woodward Governor Company, Rockford, Illinois. This new governor senses a load change in the generator output and within one hundredth of a second has physically moved the diesel throttle to adjust for the new load. This adjustment is a close approximation, and is followed by a precise adjustment by the governor speed-sensing element.

This load sensing governor provides positive control of the prime mover at all times, even in event of failure in the electrical load sensing circuit, according to Woodward Engineers. The speed-control element is isochronous, that is, it provides for constant speed of the prime mover, regardless of load, within the capacity of the engine. This governor controls the engine with zero speed regulation.

Essentially, the new Woodward load sensing governor consists of four elements housed within the governor itself and in a small auxiliary control cabinet. These elements are (1) a Load sensing Element placed on the generator output, (2) a Rectifier, (3) a speed-control governor and (4) a servomotor operated trimmer to correct for varying power factor of the generator load.

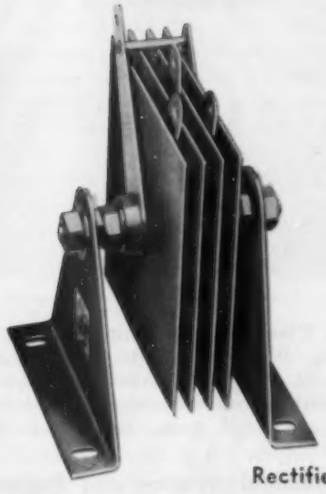
The load sensing element is electrically operated. It senses a load change before the change affects the speed of the prime mover, and actuates a solenoid activating the load control which, in turn, adjusts throttle position to the approximate new load requirement. The speed-control governor then corrects any slight error in fuel requirements. Changes in the postion of the speed-control element activates a hydraulic servo system that automatically adjusts the electrical trimmer to compensate for the new power factor.

These actions are all completed within three or four tenths of a second from the load change. This new load sensing governor is capable of controlling single or multiple synchronized power systems with zero speed regulation and is applicable to engines driving generators up to 300 kw capacity.

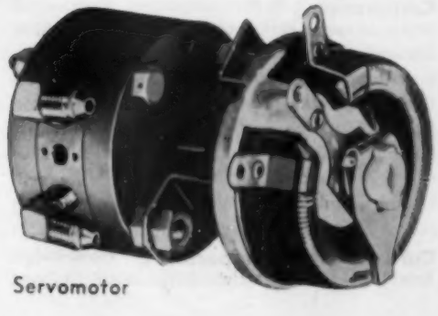


Load Sensing Governor

Load Sensing Element



Rectifier



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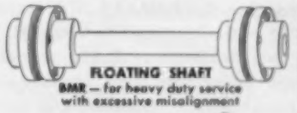
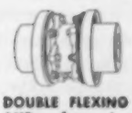
DBZ — for high speed, heavy duty drives



FLOATING SHAFT
BMR — for heavy duty service with excessive misalignment



DOUBLE FLEXING
AMR — for engine and medium speed drives

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Thomas' 40 years of flexible coupling experience is at your disposal to help you meet ordinary applications or special variations for unusual cases.

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Write for Engineering Catalog 51-A

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA, U. S. A.

GAS TURBINE PROGRESS

A COMMENTARY BY R. TOM SAWYER

R. Tom Sawyer's well known in the gas turbine field having been the first chairman (1944) (and now treasurer) of the Gas Turbine Power Division of ASME. He spent 7 years with G.E. Transportation Dept., and 26 years with American Locomotive, now Alco Products. At present he is a Consultant, including "Consultant to the Staff" of the Experimental Towing Tank at Stevens Institute of Technology. In addition to being a Fellow Member of ASME and AIEE, he is a member of SAE, ARS, ANS, IME in London, DEUA in London. He is also a member of Franklin Institute and a Professional Engineer. Mr. Sawyer is the author of *The Modern Gas Turbine* and *Gas Turbine Construction*, and co-author of *Applied Atomic Power*.

ASME Gas Turbine Conference Exhibitors

AT the conference of the ASME Gas Turbine Power Division in Detroit the week of March 18-21 an unusually fine show was held. Over 60 booths were occupied by 38 exhibitors. Following is a list of the exhibitors together with a brief description of what they had on exhibit.

Air Force Car *Sacfireboid*—Gas Turbine is the property of Boeing Airplane Company. It was originally used for laboratory development of Model 502 engine to support Navy minesweeper program. Car is property of Firestone Tire and Rubber Company. It was originally used for tire development on the Indianapolis Speedway. Installation, design and workmanship was done by Air Force personnel in early 1955 as a SAC Hobby Shop project.

Austenal, Inc., Microcast Division, New York 16, New York exhibited high temperature castings for the Gas Turbine Industry, including blades, vanes, and turbine wheels. Representatives: R. L. Wiseman, E. L. White, C. R. Skinner, D. G. McCormick, E. E. Wells.

Bendix Aviation Corporation, Scintilla Division, Sidney, New York. Ignition systems of the latest design for gas turbine engines. These systems consist of the ignition unit, igniter plug leads, igniter plugs, and control harness. Scinflex Electrical connectors for a wide variety of applications. Scinseal protected wiring assemblies for ground radar equipment, missile control wiring and other critical installations. Representatives: W. Bowler, C. Groff, P. Moran, F. O. Rettberg, J. Youmans, O. Forsberg.

Bendix Aviation Corporation, Bendix Products Division (Missile Section) Mishawaka, Indiana. Ram jet controls, hydraulic systems for guided missiles. Representative: W. E. Worley.

Boeing Airplane Company, Industrial Products Division, Seattle 24, Washington. A Boeing Model 502-10C engine in complete cutaway detail showed the working parts of the latest version of the well-known Model 502 gas turbine. Currently in production for military customers, the engine is also available to commercial users for test and evaluation purposes. Representatives: J. C. Anderson, William St. Germain, George Potter.

Brown Boveri Corporation, New York, New York. Brown Boveri is a pioneer in the field of gas turbines and the leader in units for stationary power plants, especially of large size. At the present show we stress particularly gas turbine application in chemical industry. Model of a gas turbine with Isotherm type compressor was exhibited. Also large transparencies and photos were shown of other applications. Representatives: P. R. Sidler, Z. S. Stys, A. Conger.

The Burgess-Manning Company, Libertyville, Illinois. A working model which visibly demonstrated pressure fluctuations, simple harmonics and the effect of noise in an open and closed system. Effectiveness of a Burgess-Manning silencer installed in the system. General sound attenuation information as applied to the gas turbine industry. Representatives: W. A. Carroll, Jr., R. T. Oliver, Jr., J. Kolb, L. Hanula, C. Duerr.

Clark Brothers Company, One of the Dresser Industries, Olean, New York. Display of Gas Turbine Products and Turbochargers ranging from 750 hp to 5000 hp. Representatives: Richard Jenkins, Hugh Harleston, Thomas Latimer.

The Cleveland Graphite Bronze Company, Division of Clevite Corporation, Cleveland 10, Ohio. Bearings, bushings, and seals for gas turbine engines—automotive, industrial, marine, and aircraft. Representative: R. C. Webster.

Continental Aviation and Engineering Corporation, Detroit, Michigan. Continental Aviation and Engineering Corporation's exhibit featured the J-69 turbojet engine which is in production for the United States Air Force. Items illustrating basic operating principles, construction features, and the application of gas turbine engines in production and under development by Continental were shown. Representatives: Kenneth C. Smith, Robert M. Snow, Gerald Rouillard.

Curtiss-Wright Corporation, Wood-Ridge, New Jersey. Curtiss-Wright Corporation displayed a J65 jet engine cataway currently powering seven types of military aircraft including the A4D, F11F, FJ3, and FJ4 for U. S. and NATO nations, a ramjet engine used to power military aircraft vehicles of supersonic speeds, and a model of a gas turbine engine designed and developed for marine propulsion. Representative: N. L. Mead.

Elastic Stop Nut Corporation of America. Union, New Jersey. The Elastic Stop Nut booth illustrated new engine self-locking fasteners designed for use at 1200° F. Typical application of these new designs were detailed and Field Engineers were available for consultation on fastening problems. Products samples and catalogs were at the booth. Representatives: Bruce F. Linck, Raymond T. Cooney, Walter H. Riley, Everett S. Holley, D. C. Van Anglen, William W. Curtis.

Ford Instrument Company, Division of Sperry Rand Corporation, Long Island City 1, New York. Display models and information on the closed-cycle gas-cooled reactor, as well as demonstration of Ford Instrument Company's ability to handle instrumentation and control for any reactor type. Representatives: T. Coleman, C. Hauer, F. Giles, R. Walsh.

Formsprag Company, Van Dyke, Michigan. The Formsprag booth displayed a variety of special over running clutch designs which are incorporated into gas turbine accessories. In addition to the sample clutches, there was an animated display showing the clutch function. Representatives. J. L. Buell, Jr., W. T. Cherry, R. C. Sheridan, C. F. Trapp, Jr., John Lund.

Franklin Institute Laboratories, Philadelphia, Pa. Engaged in research and development in mechanical, nuclear, electrical engineering, solid state physics, chemistry and physics. Technical staff 250, representing wide range of skills including design through prototypes to production stage. Specialities include high speed friction and lubrication, nuclear reactor design, electronic computer and electronic control design, all phases of mechanical and electro mechanical design. Representative: Morison Blake.

Fulton Sylphon Division, Robertshaw-Fulton Controls Company, Knoxville, Tennessee. Metal and plastic seals for shafts, etc. These are made to specification in many sizes and types as required for aircraft, missiles, etc.Temperature Controls for industrial processes, etc. These are self-powered controls. Simple in construction and operation. Packless Valves using the Sylphon bellows to eliminate customary packing. Made in many types, sizes and metals for specific applications. Widely used in chemical and atomic fields for general industrial processing, etc. Representatives: W. M. Watkins, G. F. Schnell, R. L. Gunn, J. B. McPeters.

General Electric Company, Gas Turbine Department, Schenectady, New York. Combustion gas turbines for electric utility, gas transmission, process industries, railroad and marine applications. Models of General Electric 7600 hp and 16,500 kw gas turbines are included. Representatives: Samuel Beardsley, J. L. Mangan, John C. Butler, C. M. Wright, H. A. Carlson.

General Electric Company, The Metallurgical Products Department, Detroit, Michigan. A continuous visualcast presentation that included photographs of facilities and equipment; also data covering the mechanical properties of vacuum melted high temperature alloys for use in gas turbines. Designations for the various types of high temperature vacuum melted alloys produced and their respective fields of application were displayed. Representatives: M. A. Burello, J. Luchok, J. S. Gillespie, W. E. Jones, J. Q. Cartty.

General Fireproofing Company, Youngstown, Ohio, displayed The Draft-a-Matic Drafting Desk. Draft-a-Matic is a new type drafting desk that operates on a completely different principle than conventional drafting tables. Draft-a-Matic eliminates all standing and stooping, which is the major cause of fatigue and reduced efficiency in drafting operations. Representatives: J. L. Morgan, J. F. Klepper.

General Motors Corporation, Fabricast Division, Bedford, Indiana. The Fabricast Division, G.M.C., display featured a revolving turbine wheel containing high-temperature blades cast by Fabricast. A wall display presented different Fabricast blades in respect to their engines and aircraft usage. A process display and a four-minute sound-color film depicted the production of typical blades and vanes. Representatives: P. E. Dolzall, R. R. Dohrmann, S. P. Niemeck, R. G. Cassicy, L. T. Byers, J. H. Reed.

General Motors Corporation, New Departure Division, Bristol, Connecticut. The focal point of the New Departure booth was an actual demonstration of a ball bearing operating at a temperature of 1100° F. The bearing operates at 600 rpm, and does not require lubrication. This demonstration was of particular interest to design engineers, confronted with bearing applications in and around hot gas exhaust of jet aircraft. Also on display were many New Departure split inner ring and accessory bearings for high speed, high temperature application. New Departure also had available a host of new engineering literature, dealing with the problems encountered in the applications of high speed, high temperature ball bearings. Representatives: Lorne F. Lavery, Richard E. Merrill, John J. Jakupco, Kenneth E. Thorp, Victor Rusnack.

Haynes Stellite Company, New York, New York. Haynes Stellite Company, Division of Union Carbide and Carbon Corporation, produces a variety of corrosion, abrasion and temperature resistant alloys. Haynes investment castings are used for turbine wheels and blades. Haynes alloys in the form of sheet, plate, bar, and forgings are used in other turbine parts where high temperatures exist. Representatives: H. C. Webb, D. M. Fridlen, F. A. Zugelder, G. L. Kroft, R. N. Davison, E. L. Delo.

The Hillard Corporation, Hilco Oil Purification, Elmira, New York. The Hillard Corporation of Elmira, New York exhibited their line of lubricating and fuel oil filters, including complete filter units, along with various types of Hilco filter cartridges for removal of particle sizes down to 5 microns. They emphasized the importance of full flow oil filtration and had available units ranging in capacity from 1 to 700 gpm, and higher when required. Representatives: T. A. LaBrecque, J. W. Peterson, Finley M. Steele, Jay Korest, George O. Eslton, Alan R. Korest.

The International Nickel Company, Inc., New York 5, New York. Highlights consisted of industrial gas turbine application cut-outs involving high temperature alloys as Nimonic 80A, Inconel X and Incoloy 901. Physical specimens consisted of Inconel X Turbine Blades. Representatives: R. F. Johnson, R. M. Wilson, C. Bieber, A. A. Conrad, C. J. Schrefer, F. J. Walls.

Diesel Progress Booth at the show with Mr. Rex W. Wadman attending.

Koppers Company, Inc., Metal Products Division, Baltimore 3, Maryland. Koppers Industrial Sound Control Department custom-engineers sound-control for gas turbine engines. Hearing loss is eliminated. Worker morale is raised, and community relations are improved. Koppers Seal Department designs and manufactures mechanical shaft seals for all types of applications. A leading supplier of mechanical shaft seals, Koppers Seal Department maintains the highest standards of craftsmanship and quality control. Representatives: Richard Lemmerman, Norman Ely, John Worthington, George Thomas, Pierce Hollingsworth.

Ladish Company, Cuhahy, Wisconsin, Representative and unusual drop forgings with special emphasis on parts for turbine power applications were displayed. Illustrations depicted latitude in sizes ranging up to 10,000 lbs for turbine and similar applications where strength and high temperatures are important factors. Rolled forged rings in rectangular and contour cross sections in sizes up to 20 ft in diameter and weights up to 60,000 lbs were also illustrated. Representatives: R. Blom, R. L. Swansen, E. Foley, R. Omelina.

Lear Inc., Grand Rapids, Michigan. Lear is a leading producer of automatic flight controls, stability augmentation systems, remote-gyro-controlled attitude indicators, latitude-compensating compass systems, remote positioning devices, high temperature air motors, pumps, electro-mechanical and hydraulic servos and electric motors. Representatives: Herbert Carlson, G. Van Westrienen, Steve Moody, Jack Harmon.

Lycoming Division, Avco Manufacturing Corporation, Stratford, Connecticut. The Gas Turbine Power Show was the first public display of the Lycoming T55, and claimed to be the lightest U. S. aircraft engine ever to achieve 1650-plus eshp. It has been developed in both helicopter and turboprop versions, as has its earlier sister engine the 825 eshp T53 gas turbine engine, also on exhibit. The T53 is currently being flight tested in the Army's Bell XH-40 helicopter and the modified Kaman HOK-1. Both engines were developed under Army sponsorship with Air Force coordination. Representatives: Paul A. Deegan, Alec Voight, J. Irwin, Dr. Fritz Haber, G. Opdyke.

D. E. Makepeace Company, Division of Union Plate and Wire Company, Attleboro, Massachusetts. Precision rolling of shapes for gas turbine engines; including air foil sections in the compressor. Representatives: S. Knutson, W. Irving, R. Ramon, R. Gaske.

Wm. W. Nugent and Company, Inc., Skokie, Illinois. Lubricating and fuel oil filters, liquid sight flow indicators and oil strainers. Oil filters exhibited were the cellulose type for micronic particle size filtering. Stationary gas turbines used for compressor drive, such as used for gas pipe line application, and gas turbine driven locomotives were some of the applications for Nugent oil filters. Representatives: F. L. Townsend, John Barrows, R. E. Pearson, P. Barrows.

Solar Aircraft Company, San Diego 12, California. Cutaways of Solar *Mars* 50 hp gas turbine engine and *Jupiter* 500 hp turbine. Illustrations showed the variety of uses to which these engines have been adapted, including air bleed compressors, variable speed propulsion units, and constant speed applications for pumps and generators. Modifications of the *Jupiter* to effect this variety of applications were also illustrated. A short movie of the Solar *Meteor,* powered by the variable speed *Jupiter,* was also shown. When installed in the 40 ft personnel boat, the *Jupiter* was the largest gas turbine in Navy use. The gas turbine doubled the speed of the craft although the hull was not designed for high speed performance. Representatives: J. M. Sayre, F. Q. Wilson.

Sylvania Electric Products, Inc., Atomic Energy Division, Bayside, Long Island, New York. Sylvania's exhibit included a three-dimensional "flow chart" in which fabrication steps for one

type of atomic fuel element are traced. Mounted in a simulated graphite-moderated reactor are unclassified fuel-element and control-rod shapes, for use in various types of reactors. Representatives: Stanley B. Roboff, Leonard W. Kates, Leonard Smiley.

Universal - Cyclops Steel Corporation, Bridgeville, Pennsylvania. Precision cold rolled airfoil stock. Jet engine and gas turbine alloys. High temperature metals. Heat resisting, high speed, die, stainless and tool steels. Representatives: O. C. Beckbisinger, R. F. Duff, A. E. Hope, W. J. Long, S. A. Oviatt, W. A. Kocher, M. C. Metzger.

Westinghouse Electric Corporation, Industrial Gas Turbine Department, South Philadelphia Works, Philadelphia, Pennsylvania. Photographs, models, animated exhibit, and various pieces of literature, showed the application of industrial gas turbines to power generation, pipe line compressor and other mechanical drive, refiner use, process application, petro-chemical and chemical steel mill application, and repressurizing of oil fields. Installation photographs were shown. Representatives: R. T. Nalle, K. C. Wein, R. W. Ek, T. J. Putz, D. R. Jones, C. J. Burke, J. Yindra.

Woodward Governor Company, Rockford, Illinois. Manufacturers of Controls for Prime Movers. The exhibit consisted of several cutaway models of speed governors and fuel controls for small gas turbines as used on ground power units and aircraft auxiliary equipment, and one larger fuel control unit for use on a large gas turbine for aircraft propulsion. Representatives. Harland Plummer, Carl Schelin, Fred Newburgh, Walter J. Evans.

York Corporation, Subsidiary of Borg-Warner Corp. York, Pennsylvania. The York Turbomatic Compressors, one of which was on display, are available for normal air conditioning duty in the range of capacity from 100 to 600 tons. The water cooling systems, of which the Turbomatic Compressors are an integral part, are factory assembled including prefabricated interconnecting piping. These compressors are ideally suited for gas turbine drive where gas is available as a fuel for air conditioning purposes. Representatives: C. N. Ehehalt, J. H. Anderson, L. P. Quinlivan, Bob Miller, R. C. Niess.

Even though this was one of the finest shows ever held covering all types of gas turbines, we expect next year to be much larger at the International Gas Turbine Conference and Exhibit, Washington, D.C., the Shoreham Hotel, week of March 3, 1958.

FUEL INJECTION EQUIPMENT DIVISION
of
LUCAS ELECTRICAL SERVICES, INC.

Head Office: 653 Tenth Avenue, New York 36, New York
Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio
West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California

Canadian Distributors:
Joseph Lucas (Canada) Ltd., Head Office: 11 Davies Avenue, Toronto 8, Ontario
Branch Office: 3401 St. Antoine Street, Montreal 30, Que.

AP.174-830

Three Promoted at Cooper-Bessemer

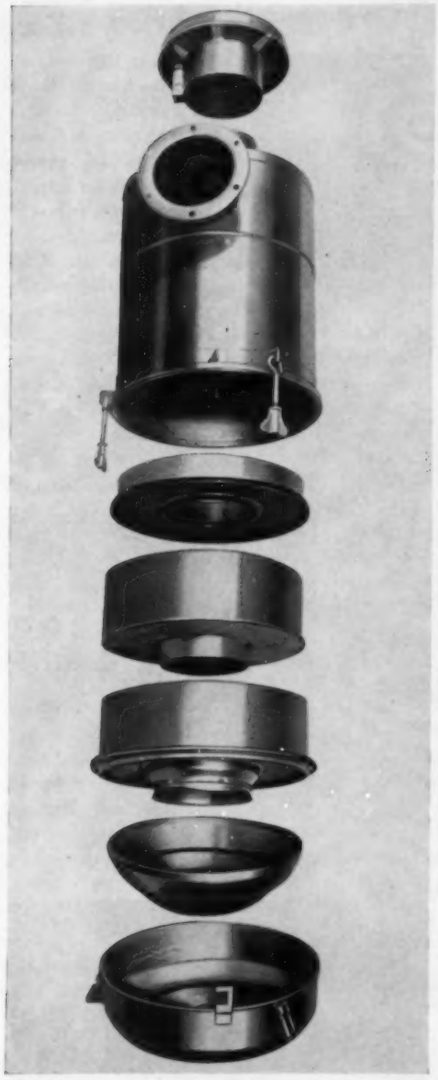
The elevation of E. C. Phelps to Works Manager of Cooper-Bessemer's Mount Vernon, Ohio plant has been announced by Eugene Miller, General Manager of the Cooper-Bessemer Corporation. At the same time, the promotion of Harold C. Johnson to Manager of Manufacturing was made public. Mr. C. W. Gilchrist has been made Assistant Works Manager. As new Works Manager of the Mount

Left to Right—Peter R. Letz, E. C. Phelps, New Works Manager, Mount Vernon Plant, and Harold C. Johnson, new Manager of Manufacturing.

Vernon plant, Edward C. Phelps fills the position formerly held by Peter R. Letz. A veteran of 40 years with Cooper-Bessemer, Mr. Letz has taken on the assignment of directing a major expansion program by Cooper-Bessmer at both its Mount Vernon, Ohio and Grove City, Pennsylvania plants.

Mr. Johnson in his new position as Manager of Manufacturing will administer the combined production facilities of both plants, Mr. Miller explained. Formerly foundry superintendent for the Cooper-Bessemer Corporation, Mr. Gilchrist is well known in the machinery building field for his work with high strength iron and nodular iron for high strength castings. He is a director of the American Foundrymen's Society.

UNITED 999 AIR CLEANER



A NEW line of oil bath air cleaners for diesel engines has just been introduced by United Specialties Co. These new units, designated 999 Remov-All series, feature removable elements and removable after cleaner. United engineers state that this new air cleaner has a 99.9% dirt-removal efficiency, which accounts for the 999 name. The oil bath sections in these new air cleaners are combined in a single unit with a fibrous after cleaner which does not need replacing. All cleaner elements are designed for quick and easy removal, cleaning and reinserting. The entire unit is built to facilitate minimum servicing time and effort by one man. For example, once the cleaner housing is installed on the engine or prime unit, it is not necessary to break the connections to service the air cleaner, and therefore no resealing problems are present.

The after cleaner, or top element, has been thoroughly field tested at temperatures from -65° to 145°F. United describes the filter material as structurally strong to withstand operating shocks; it will not fracture under air load shock, and sealing is positive in all directions and against all flanges. The entire cleaner and after cleaner has been designed so that only proper reinstallation is possible. Both the middle and bottom sections, which are not identical in structure to insure correct installation, have filter elements composed of wire springs. These springs are positive meshing and non-collapsing, to provide positive oil wash action without channeling. Bracketed studs on the center tube and large wing nuts, located on brackets in the element centers, allow easy hand assembly.

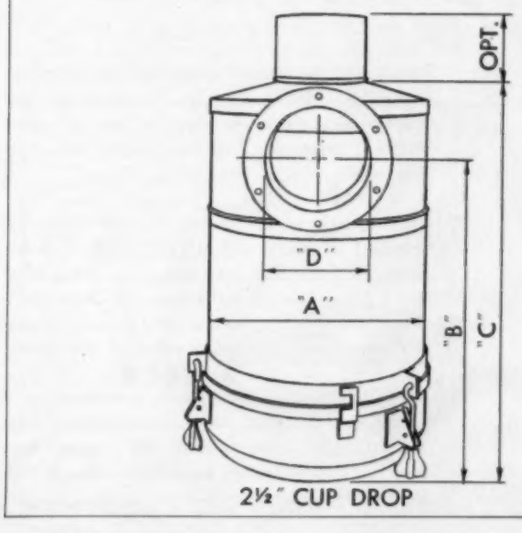
When servicing on only the lower element is necessary, it is removed easily for washing, by only unfastening one wing nut. Servicing ease is also incorporated in the oil cup design. The inner baffle (which incorporates United's 'dirty-clean' oil separation and 'bounce-splash' control) can be removed by a wing nut jack screw. This nut, as well as all other wing nuts, is permanently fastened to the specific piece. After the baffle is removed, the cup can be cleaned easily. The cup can also be filled with solvent and used for cleaning all other elements.

Unitizing of the assembled elements is accomplished as the three cup holders are drawn tight. These three holders are spaced at 120° upon a rotating band on the cleaner body and definitely position and seal the cup. When the cup is replaced it is initially suspended upon the two hooks, which are rotated to the handiest installation location. Removal of the cup and all parts is accomplished with only a clearance space of 2½ in. below the cup. This space is usually necessary under any standard oil bath cleaner cup.

This new oil bath air cleaner is primarily designed to accomplish two important objectives: 1.-to effectively meet the air filtration requirements of the modern, high output diesel engine of today, particularly the turbocharged diesel; and 2.- to make air cleaner servicing as easy and quick as possible to allow minimum downtime of equipment. Important and useful accessory developments like this are key factors in increasing the practical and profitable application of diesels.

The new United 999 series air cleaner is fully illustrated in these three views, which show the individual elements of the air cleaner, a size and capacity chart, and the fully assembled air cleaner.

MODEL	DIAMETER "A"	RATED C.F.M.	HEIGHT "B"	OVERALL "C"	OUTLET "D"	RADIUS+2" FLANGE
52	9	260	18	21-1/4	3-1/2	6-1/2
53	10	350	18-1/4	21-3/4	4	7
55	12	535	18-1/4	21-3/4	4	8
57	14	825	19	23-3/4	5-1/2	9
60	17	1150	19-1/2	24-1/4	6-1/2	10-1/2
63	20	1600	20	25-1/4	7-1/2	12



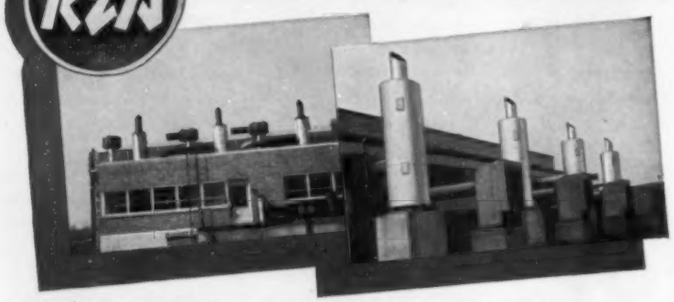
Eastern Diesel Observations

(Continued from page 60)

this means stop-and-go driving with great loads of aggregates and mixers moving on schedule. Here we find two different types of automotive diesels in two classes of service which in all respects are as difficult or more difficult to cope with than lugging freight trailers around town. It leads me to believe that the aforementioned "voice of experience" is not too reliable after all.

In the maintenance shops of the trucking lines, at least in many of them, the diesels and the gasoline engine powered vehicles are separately serviced by specially trained men for each general class of prime mover. Obviously they could not standardize on gasoline motors because the fuel cost for open highway work and other important economy factors make the expense prohibitive. However, it is apparent that standardization on diesel could be done at substantial reductions in operating expense, simplification of mainteance practices, reduced inventory of replacement parts, greater interchangeability of parts in engines and of engines in vehicles and more extensive standardization of transmissions and all other accessories. In fact, I believe that many of my good friends who sell diesels should take it upon themselves to tell the truckers the facts of life. If they succeed they will garner in some nice new business and do the truckers a favor in the bargain.

REA AWARD WINNERS



THESE "TOP" EFFICIENCY PLANTS USE MAXIM SILENCERS

Here are the "Highest Efficiency Award" REA plants for 1956, and they are 100% Maxim equipped for quiet, efficient, round-the-clock operation. All seven Cooper-Bessemer engines, three at Caro, Michigan and four at Poplar Bluff, Missouri, have Maxim Exhaust Silencers. For this kind of efficient, trouble-free, effective silencing consult Maxim. Bring your file up-to-date by using the coupon below.

Top left: Caro, Michigan Plant of Thumb Electric Cooperative

Top right: Poplar Bluff, Missouri Plant of M&A Electric Cooperative

THE MAXIM SILENCER COMPANY
Subsidiary of Emhart Manufacturing Company
94 Homestead Ave., Hartford, Conn.

Gentlemen: Please send bulletins on silencers for:

☐ WASTE HEAT RECOVERY
☐ INTERNAL COMBUSTION AND STEAM ENGINE EXHAUST AND INTAKE
☐ AIR COMPRESSOR INTAKES AND DISCHARGES
☐ VACUUM PUMP DISCHARGES
☐ BLOWER INTAKES AND DISCHARGES
☐ STEAM, AIR OR GAS DISCHARGES
☐ JET AIRPLANE ENGINE EXHAUST AND INTAKE

NAME _____
COMPANY _____
ADDRESS _____

Service Manager Named

Wren Jones

Wren Jones has been advanced to the position of Parts and Service Manager of American MARC. Wren Jones' background for sales and service administration was gained by experience as a technician in field service, field installation, and testing and laboratory experiments with Hallett diesels for the past six years. He has a broad knowledge of the problems confronting engines in many areas due to his diesel research and development in climatic laboratories. After transferring from the laboratory to Promotion Control and association with the production manager in the making of diesels he has now taken on this new position of Parts and Service Manager.

Jones served six years with the U. S. Navy, of which four years were spent in the South Pacific theatre during World War II.

Multi-Purpose Freighter

Recently launched, the multi-purpose freighter, *Inter-Americana,* is the second of this shallow type vessel built by Dade Drydock Corp., Miami, Florida. The 140 ft steel vessel was constructed for the Foster-Williams Bros., Inter-American Highway Contractors of Costa Rica, C. A. *La-Inter-Americana* was designed and built by Dade Drydock in

Anabel Granados, Miss Costa Rica of 1956, christening the *La Inter-Americana* at Dade Drydock Corp. Also on the platform are Alex Balf, President of Dade Drydock, Ray Pearlson, N. A.M.E., of Dade Drydock.

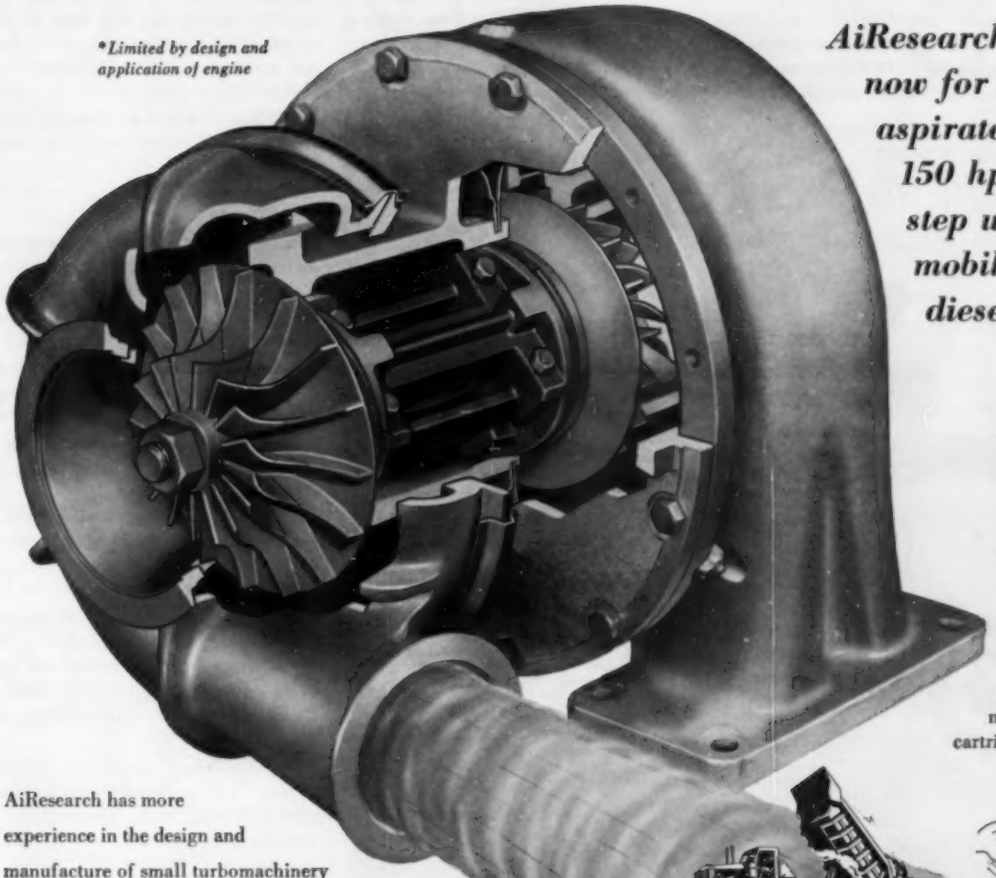
90 days time for use on rivers in Central and South America. The design called for a 7 ft draft fully loaded so it can navigate shallow rivers. It will be used first to carry heavy construction machinery and equipment for the Pan American Highway construction in that Central American Republic.

Propulsion power in the *La Inter-Americana* is provided by two model D375 Caterpillar diesels rated 300 hp each at 1000 rpm. The diesels drive a 3:1 Snow-Nabstedt reduction gear. The 56x38 Ferguson propellers give it a speed of approximately 11 knots and a cruising range of 5000 miles.

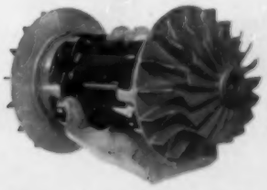
The Caterpillar diesel auxiliary generating units have a model A15R10J Schwitzer air cranking units for starting. The engine room also contains Ross heat exchangers, Quincy air compressors and Fairbanks-Morse fresh water systems.

AiResearch Turbochargers improve diesel engine performance up to 100%*

**Limited by design and application of engine*



AiResearch units are available now for use with normally aspirated diesel engines of 150 hp and up. They step up performance of both mobile and stationary diesels, land or marine.

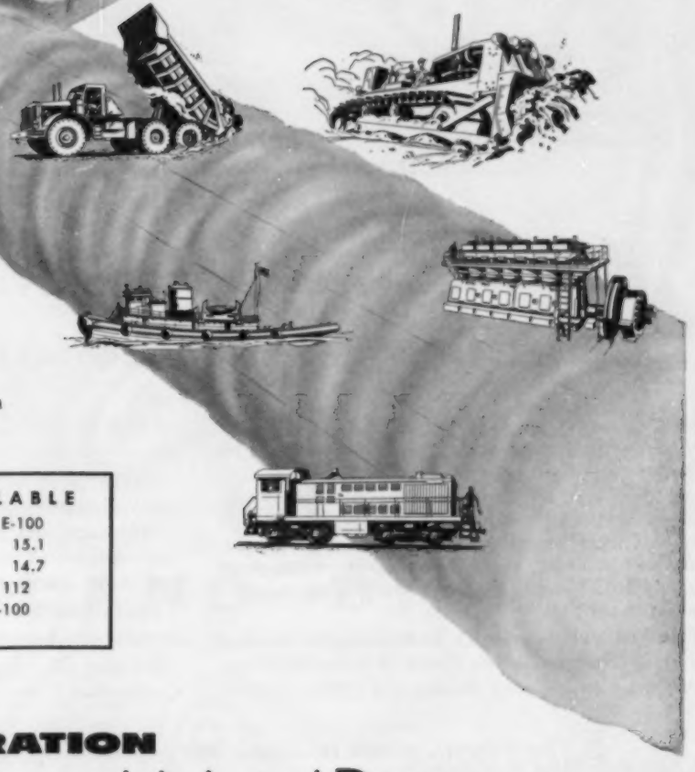


Removable cartridge simplifies repair and overhaul

This cartridge contains the turbocharger's rotating assembly, bearings and seals in a factory balanced package. It can be replaced in minutes with another factory balanced cartridge by a mechanic on the scene.

AiResearch has more experience in the design and manufacture of small turbomachinery than any other company in the world. This experience has led to refinements in AiResearch turbochargers which make them the most efficient and safest units of their kind. New additions to the AiResearch family of turbochargers have widened their range of application in the diesel engine industry.

Our engineers will welcome the opportunity to work with you in improving the performance of your diesel engines. We are happy to confer on possible application of the turbocharger principle to your power plants.



AIRESEARCH TURBOCHARGERS NOW AVAILABLE				
MODEL	F-51	C-60	A-60	E-100
Diameter — in. nom.	10	11.5	15.25	15.1
Length — in.	10.5	12.9	16.75	14.7
Weight — lb.	40	95	125	112
Output — lb/min. (Standard Conditions)	29-51	30-60	38-60	50-100

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND RELATED MACHINERY

West Coast News

By James Joseph

FOR PUMP, Pipe & Power Co., Portland, a Fairbanks-Morse 45C3-⅛, 5¼ hp diesel unit.

REPOWERING from gas to diesel, Ouzinkie Packing Co., Alaska, has purchased for one of its fishing vessels a GM 4-51 diesel engine.

TWO GM 6-71 diesels will go into Fred Dobbs' new cruiser, being built in Seattle.

TOP speed of 23 knots, continuous cruising speed of 19 knots is anticipated by Tacoma, Washington's Leo Long as he repowers his 51-ft Chris Craft *Corsair* with two GM 6-71 aluminum inclined engines.

FOR American Independent Oil Co., San Francisco, two 6 cylinder, 230 hp, Fairbanks-Morse 49B4½ diesel engines.

GUNTERT & Zimmerman Construction Div., Inc., Stockton, Calif. has taken delivery of a Fairbanks-Morse 38F5¼ diesel, 8 cylinder, 450 hp.

JUMBOIZING—the stretching of World War II tankers by insertion of 50-ft midsections, increasing their tankage capacity—should, say ship men, spread to west coast yards, mean overhaul business for engine companies.

TO PACIFIC American Fisheries, a Caterpillar D-153 diesel unit as auxiliary on power barge.

INSTALLED on Nils Farstad's schooner *Brisk*, an Allis-Chalmers 8-DAMR-1125 diesel, 190 hp @ 1600 rpm, with 3:88-1 Capitol hydraulic gear. Sale by Seattle's Pacific Fishing & Trading Co.

COMMERCIAL Marine Construction Co., Seattle, has installed a new fishing vessel with a GM 4-51 diesel. Sale via Evans Engine and Equipment Co., Inc., Seattle.

FOR its rock crushing plant, Snohomish county (Wash.) has purchased a GM 4-71 diesel.

FOR repowering a model 22B Bucyrus-Erie shovel, S. C. Breen of Chehalis, Wash., logging road constructor, has taken delivery of a GM 3-71 industrial diesel engine.

TO ALBINA Engine and Machine Works, Portland, a Fairbanks-Morse model 49B4½, 58 hp marine unit (2 cylinder).

A GM 6-71 diesel is repowering Elmer Martens' halibut boat *Lorelei II*, the boat working from Seattle.

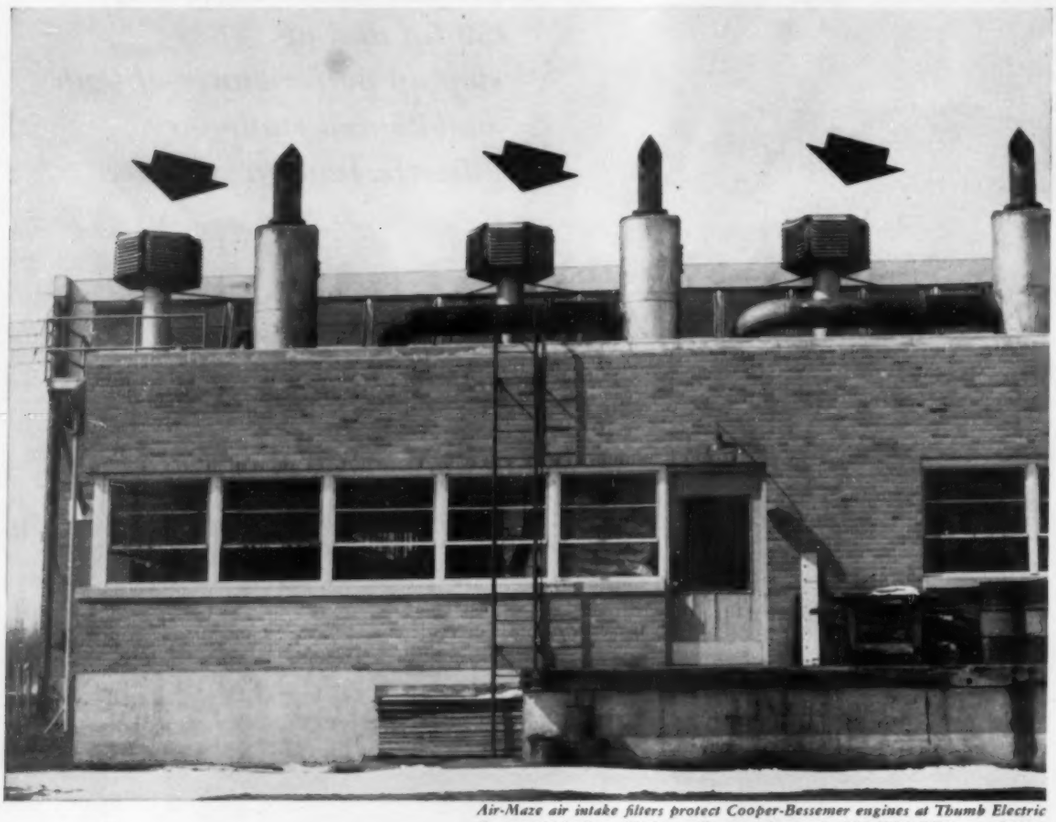
WESTERN Electric Co., San Leandro, Calif., has purchased two Fairbanks-Morse model 45B4-⅛, 10½ hp diesel generating sets.

GENERAL Construction Co., Portland, has recently installed their second Allis-Chalmers 6DAMR-273 marine engine as auxiliary for work in and around Portland.

TO STOCKTON, Calif.'s Guntert & Zimmerman Construction Div., Inc. a 12 cylinder, 2250 hp model 38D8-⅛, Fairbanks-Morse diesel.

EARL Wright, Portland, Ore., will power his new 42-ft pleasure cruiser with an Allis-Chalmers 6DASMR-844 marine diesel with Capitol 2:11 to 1 right-hand hydraulic gear. Boat, to operate from Depoe Bay, is being built by Nickols Boat Works, Hood River.

TO P.S. PELL & Company, Honolulu, T.H., a Fairbanks-Morse model 45B3-⅛, 5¼ hp diesel generating set.



Air-Maze air intake filters protect Cooper-Bessemer engines at Thumb Electric Cooperative's Caro, Michigan Plant—winner of 1956 REA Efficiency Award.

For peak engine efficiency specify Air-Maze air filters

EFFICIENT filtration of intake air is only one factor in keeping gas and diesel engines running at peak efficiency—*but a mighty important one!*

Air-Maze Type F oil bath air filters provide positive protection against harmful dirt entering engine air intakes. These filters are easy to install, simple to service. Many such Air-Maze filters installed over twenty years ago are still operating, without ever having required a replacement part.

Endorsed and used by all leading engine builders, Air-Maze offers the widest choice of types including:

Automaze self-cleaning curtains and LPD cylindrical oil bath filters for large volumes of air, extremely low pressure drop.

Stack-type oil bath filters for smaller air volumes on mobile equipment.

Multimaze and DH panel assemblies for adequate impingement filtration where dirt loads are low and low initial cost is a factor.

Electromaze electronic air cleaner for removal of sub-micronic dust.

For new all-line catalog write Air-Maze Corporation, Cleveland 28, Ohio.

AFI MEMBER

The biggest names in diesels are protected by Air-Maze filters

AIR FILTERS
SILENCERS
SPARK ARRESTERS

AIR-MAZE
The Filter Engineers

LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS

Blower Service Tools

A new blower service tool set for GM Detroit Diesel Roots-type blower units has been announced by Kent-Moore Organization, Inc., 1501 So. Jackson Street, Jackson, Mich., designers and manufacturers of special service tools. The service set is applicable to the old and new Roots-type blowers used in GM Models 3-71, 4-71, and 6-71 engines and the new Roots-type 6-110.

Use of the set, which is made up of nine components based on manufacturer's specifications, provides for correct removal and installation of gears, plates, bearings, seals and other parts, while minimizing risk of damage to precision-machined surfaces of the blower parts. The blower tool set is intended for any shop doing engine maintenance on Detroit Diesel engines. (ITS NEW)

Centrifuge Bulletin

This new bulletin, OP No. 109, describes the various model De Laval Centrifugal Oil Purifiers and their particular applications. The capacities of each centrifugal, for different material, is given as well as actual installation photographs of the various machines. For this bulletin, write The De Laval Separator Company, Poughkeepsie, N. Y.

(ITS NEW)

Booklet on Filtration

A new booklet entitled, "Fulflo Filters for Water and Aqueous Liquids" has just been released by Commercial Filters Corporation. Fully illustrated, the booklet contains technical data on each model, including number of gallons filtered per minute, operating pressures, tube lengths, pipe sizes, inlet-outlet sizes, height and weight. Chart indicates pressure drop in psi across a new Honeycomb Filter Tube at various flow rates up to 6 gpm. Booklet may be obtained at no charge by writing to Commercial Filters Corporation, 2 Main Street, Melrose 76, Massachusetts. Ask for #GEO-501. (ITS NEW)

Administrator of Engineering

The appointment of Lt. Gen. Bryant L. Boatner, U.S. Air Force, retired, to the position of administrator of engineering for Eaton Manufacturing Company was announced recently by Martin P. Winther, vice president-engineering.

General Boatner joined Eaton Manufacturing in December, 1955 upon his retirement from the service to counsel and advise in the area of general aircraft affairs. "In his new position as administrator of engineering under the office of director of engineering, General Boatner's duties will be corporation-wide extending to all 17 divisions and two subsidiaries of Eaton," Mr. Winther said.

A West Point graduate, class of 1928, General Boatner was a career airman in the U.S. Air Force. His service included tactical assignments in fighter types of airplanes, procurement and production, chief of aircraft modification, commanding officer of the European Wing of the Air Transport Command with headquarters in Paris, Commander of the Air Force Proving Ground at Elgin Air Force Base in Florida, The Inspector General of the Air Force, and Deputy Chief of Staff for Material, his last assignment prior to retirement. General Boatner resides with his wife at 13900 Shaker Boulevard, Cleveland, Ohio.

COMING MAY 15! The Brand New **DIESEL ENGINE CATALOG,** Volume 22. This giant, 400 page, 10½" x 13½" fully illustrated reference book containing complete and detailed engine and accessory sections is the biggest and best yet. **SPECIAL OFFER!** If you send in your cash order on or before May 15, you will receive a 10% discount on the Catalog price, which means it will only cost you $9.00 postpaid plus California sales tax where applicable, instead of the regular $10.00 price. Send your cash order now to **DIESEL PROGRESS,** 816 N. LaCienega Blvd., Los Angles 46, California.

4200 horsepower for the big push

Chotin Transportation's CYPRESS . . . the most powerful river towboat ever built in the Gulf Coast area.

Capt. Scott Chotin, Secretary-Treasurer of Chotin Transportation, Inc., says, "With the CYPRESS we expect to not only increase the speed of the tow but also the tonnage because of the higher horsepower. This means a greater return on our investment. That is why we selected General Motors Turbocharged Diesel engines."

The CYPRESS gets her tremendous power from a pair of General Motors Turbocharged Diesels, because they deliver more power per cylinder, weigh less per horsepower and have better fuel economy.

The CYPRESS was designed and built by J & S Shipbuilding Corp., Slidell, La.

A GOOD PRODUCT PLUS GOOD SERVICE GIVES TOP PERFORMANCE

CLEVELAND DIESEL

An Engine Division of General Motors • Cleveland 11, Ohio

For full details on the CYPRESS, write for your copy of the *Diesel Times*. We'll be glad to put you on our mailing list.

SALES AND SERVICE OFFICES:

Boston, Mass., 9 Commercial Ave., Cambridge, Mass. Tel.: Eliot 4-7891
Chicago, Ill., 216 West Potomac Ave., Lombard, Ill. Tel.: Randolph 6-9214
Dallas, Texas, 9404 Waterview Road Tel.: Fairdale 2403
Honolulu, T. H., 3115 Diamond Head Road. Tel.: Honolulu 99-9202
New Orleans, La., 727 Baronne St. Tel.: Magnolia 6761
New York, N. Y., 10 East 40th Street Tel.: Murray Hill 5-4372
Norfolk, Va., 554 Front Street Tel.: Madison 2-7147
Pittsburgh, Pa., 469 Marlin Drive Tel.: Locust 1-2173
Portland, Ore., 3676 S. E. Martins St. Tel.: Prospect 1-7509
St. Louis, Mo., 2 N. Wharf St. Tel.: Main 1-0642
San Diego, Calif., 3886 Sequoia Street Tel.: Broadway 3-1752
San Francisco, Calif., 870 Harrison St. Tel.: Douglas 2-1931
Seattle, Wash., 4300 11th Avenue, N.W. Tel.: Hemlock 9000
Wilmington, Calif., 433 Marine Avenue. Tel.: Terminal 4-4098

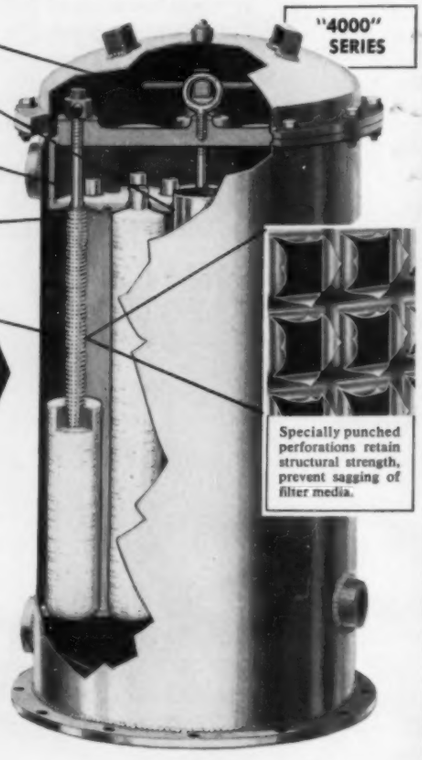
CLEVELAND DIESEL GM

THE PROBLEM: **"Heavy duty filtration to your specification"**

THE ANSWER: **"ENGINE LIFE *Maxiflo* '4000' SERIES OF FULLY ENCASED, MULTIPLE FILTER SYSTEMS!"**

Replaceable Element Filtration For Marine, Diesel and Natural Gas Engines In:

HEAVY INDUSTRY (Pipelines & Power Plants)
CONSTRUCTION (Heavy Earth-Moving Equipment)
MARINE ENGINES • STATIONARY ENGINES



- Elements uniformly compressed with wing-nut bolts. This reduces service cost factor.
- Neoprene "O" Ring Seal insures perfect seal, eliminates gasket replacement.
- Cast aluminum manifold for ideal element compression.
- Piston type bypass valves do not orifice when open, valves face downward so abrasives will not adhere to piston and be flushed back into engine.
- Heavy welded steel construction.

Maxiflo non-corrosive metal cores handle up to ten times normal running volume, give solid vertical support.

MODERN FUEL CONDITIONING THROUGH *Maxiflo* "4000" FULL FLOW SYSTEMS

- Condition viscous lube oil and fuel.
- Remove, neutralize acid without using chemicals.
- Trap abrasives: carbon, dust, metal particles.
- Meet today's supercharged engine requirements.
- Give maximum oil flow, minimum pressure loss.
- Repel moisture on element surface.

Maxiflo* "3000" SERIES *Ratio-rated for:

OIL DRILLING RIG ENGINES • PUMPING ENGINES • TRUCKS • MARINE ENGINES (light) • CONSTRUCTION (Euclid trucks, shovels, etc.)

For moderately heavy duty installations, the Maxiflo "3000" Series offer the same consistent performance as the "4000" Series.

FOR BOTH *Maxiflo* "4000" AND "3000" COMPLETE DIMENSION DRAWINGS AND SPECIFICATIONS FURNISHED ON REQUEST

A Comprehensive Line of Filters and Replacement Elements

ENGINE LIFE PRODUCTS CORPORATION

EL MONTE, CALIFORNIA

Appoints New Chicago Distributor

The Detroit Diesel Engine Division of General Motors has announced the appointment of the Western Engine Company as distributors of the Division's line of two-cycle Diesels in the Chicago and Northern Illinois area. The distributor is a new corporation formed for the sale and service of industrial and marine engines, exclusively. Officers of the company are also associated with the Western Machinery and Engine Company, Detroit Diesel distributors in St. Louis since 1945. They are Hugh Scott, Chairman of the Board; John Lundahl, President and General Manager; Gilbert Weidlich, Vice President and Hugh Scott, Jr., Secretary and Treasurer.

Robert Bowles, who was also associated with Western Machinery in St. Louis, has been appointed engine sales manager while R. Boschert and E. Schneider head the parts and service departments, respectively. All are well known in the diesel engine industry and bring to the new company a wide experience in the application and servicing of Detroit Diesel engines. The new company is located at 7122 Ogden Avenue, Berwyn, Illinois where parts and service facilities have been established. According to Mr. Lundahl further expansion in the area is already under consideration. The Henry C. Grebe Company, Inc. of Chicago will continue as dealer for Detroit Diesel marine products under the new distributor.

Steel Hardening Compound

Chromelloy is a steel hardening compound which hardens from the surface inward by a carburizing, nitriding and alloying effect, often effecting, in addition to hardening, an increase of tensile strength throughout the steel. It can be used for the hardening of a wide variety of steels for production and maintenance tools, as well as for the hardening of production pieces. With Chromelloy, production parts, production and maintenance tools can be made of mild steel and then hardened with Chromelloy. Pieces thus made will last several times longer than tools made of steel and hardened in the ordinary way according to the manufacturer. Hardening with Chromelloy is simple and economical. Small tools or parts are heated in a forge or flame, dipped in Chromelloy powder, then reheated for about 2 minutes and quenched. The entire operation takes only about 5 minutes.

Chromelloy is useful in maintenance and machine shops, since repairs and replacements of parts can be made in less time while still producing a product of high quality that will still give long life and minimize production interruptions. Parts or tools are quickly machined of cold rolled or other mild steel, or almost any other steel on hand, with no waiting for stock to arrive. The heat treatment is fast with only 5 minutes being required for a several thousands case. One hour of pack hardening with Chromelloy will produce a $\frac{1}{32}$ in. case of 65-68 Rockwell C, using cold rolled steel. Shops using Chromelloy reduce their steel inventory to a minimum, and because Chromelloy contains no cyanide and emits no toxic fumes, expensive heat treating and ventilating equipment are unnecessary. Chromelloy is packed in moisture-proof, metal cans or drums, keeps indefinitely and is always ready for use, providing the shop with a method of quickly producing a part of exactly the desired hardness and quality for routine operations and in any emergency.

Chromelloy is used on dies, taps, punches, reamers, drills, cams, set screws, gears, jigs, fixtures, gages, nuts, bolts, chisels, washers, hammers, rivets, chains, camshafts, axles, axle pins, swivel joints, etc. For more information write U.S. Metallurgical Labs, 381 Fourth Ave., New York 16, N.Y. (ITS NEW)

PT Fuel System Booklet

How many parts are in the Cummins PT Fuel System? Is the fuel metered in the pump or in each individual injector? Does the PT Fuel System have to be timed to the engine? These questions as well as many others are answered in a 12 page booklet, *Cummins PT Fuel Injection System*, released by Cummins Engine Company, Inc., Columbus, Indiana.

The booklet is printed in four colors and is well illustrated. Cutaway views of the four PT fuel pump assemblies as well as the PT injector make it possible for the reader to understand the inner workings of this simple diesel fuel system. A section is also devoted to optional governor arrangements. The PT Fuel System is adaptable to all Cummins Diesels built since 1932. Copies of the new PT Fuel System bulletin may be obtained by writing Cummins Engine Company, Inc., Columbus, Indiana or by contacting any of the Cummins Distributors or Dealers. (ITS NEW)

COMING MAY 15! The Brand New **DIESEL ENGINE CATALOG,** Volume 22. This giant, 400 page, 10½" x 13½" fully illustrated reference book containing complete and detailed engine and accessory sections is the biggest and best yet. **SPECIAL OFFER!** If you send in your cash order on or before May 15, you will receive a 10% discount on the Catalog price, which means it will only cost you $9.00 postpaid plus California sales tax where applicable, instead of the regular $10.00 price. Send your cash order now to **DIESEL PROGRESS,** 816 N. LaCienega Blvd., Los Angles 46, California.

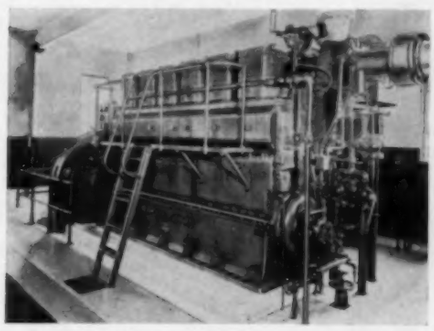
Division Manager

H. J. Kinkade

Mr. H. J. Kinkade has been appointed Manager of the Perfex-Pak Division of the Perfex Corporation of Milwaukee, Wisconsin. The new Division will manufacture and distribute large air cooled heat exchangers for industrial and oil field process cooling, and for the cooling of large engines and compressors, as well as for steam condensing, gas cooling and related services. Mr. Kinkade was graduated from the University of Missouri Engineering School in 1925, and has been actively engaged in heat transfer engineering most of the time since that date. He worked first for the Armstrong Cork Company in the Insulation Division concerned with heat insulation for hot and cold surfaces. Later employers were the York Ice Machinery Corporation in refrigeration and air conditioning; Fairbanks-Morse and Company, air conditioning, engine cooling, and process heat transfer; Young Radiator Company, engine cooling, and industrial and oil field process heat transfer.

Gas Engines Supply Station Power

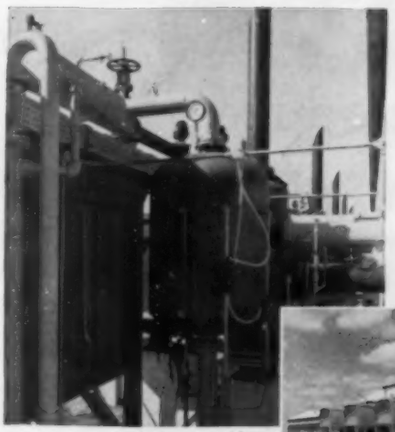
As part of its expansion program to bring an additional 278.2 million cu ft of gas per day into Southern California, the Southern California Gas Company of Los Angeles has purchased two Worthington SCCG-6 gas engine-generator units to supply complete station power for their Topock, California, gas transmission compressor station. The Worthington engines incorporate the latest high compression turbocharged design together with the relatively new Bosch pulse generator ignition system which lowers maintenance materially. A special feature of the units, which will be new to the gas transmission industry, will be the installation of a vapor phase cooling system. In applying vapor phase cooling, the cooling water temperature is well above the boiling point.



Worthington SCCG-6 gas engine-generator unit.

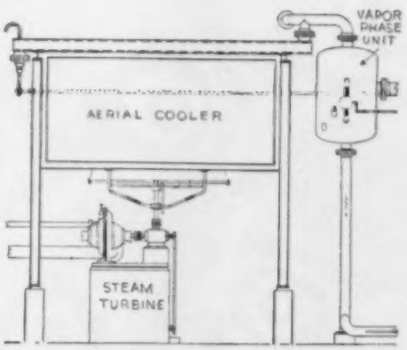
The Topock station, located on the Colorado River a few miles south of Needles, California, will be the eastern extremity of the new 241-mile, 30 in. natural gas pipeline. Crossing westwardly over undeveloped territory of desert and mountainous land, the line will end at the Newhall pressure limiting station, north of San Fernando. When completed in mid-1957, the new line will have cost an estimated $28 million.

UNITED GAS PIPE LINE CONVERTS TO VAPOR PHASE



Eliminates Engine Power for Driving Turbine Fan . . . Utilizes Power Cylinder Waste Heat

In January, 1954, United Gas Pipe Line Company installed Vapor Phase Thermal Circulation on five 880-bhp gas engine compressors at their Agua Dulce, Texas, gas compressor station.



During September, 1956, one fan-drive was converted to the Vapor Phase Steam Turbine Fan Drive (utilizing power cylinder waste heat as steam at 15 p.s.i.g. pressure), thus eliminating engine power formerly required to drive the fan for lube oil cooling and steam condensing.

"Sole Developers and Manufacturers of Vapor Phase Thermal Circulation (Ebullition) Engine Cooling"

E C VAPOR PHASE

ENGINEERING CONTROLS Incorporated

AN AFFILIATE OF ST. LOUIS SHIPBUILDING & STEEL CO.

328 Paul Brown Bldg. St. Louis 1, Mo.

1939 North Hillhurst Ave. Los Angeles 27, Calif.

Northeast Diesel Notes

By **Arnold B. Newell**

A TUG 100 ft 3 in. long, 27 ft beam and 14 ft depth of hull has been ordered by Bay-Houston Towing Company to be built by the Gulfport Shipbuilding Corporation of Port Arthur, Texas. The power is a General Motors 1600 hp diesel.

TWO 59 ft draggers have been finished at Blacks Harbour, New Brunswick. The beam is 16 ft and draft is 7 ft. Engines are Caterpillar D342 with 3.96:1 Snow-Nabstedt reverse and reduction gears. The vessels are of wood construction, built at the Connors Brothers, Ltd. yard to designs by Eldridge-McInnis of Boston. Construction was financed by the New Brunswick Loan Board plan. One boat will be owned by Victor Newman of Wilsons Beach and the other by Maybury Ossinger of Grand Manan.

THE FORD Marine Diesel, Model D4F has been placed on the market by Osco Motors of Philadelphia. This is the 4-cycle engine used in Ford tractors.

A SECOND contract has been awarded to the Gulfport Shipbuilding Corporation of Port Arthur, Texas for construction of two 94 ft 1200 hp diesel tugs to be built for the Bay-Houston Towing of Houston, Texas.

ANOTHER diesel tug 90 ft long will be built for the Matton Towing Corporation of New York by John E. Matton & Sons, Inc. Cohoes, N. Y. Machinery particulars have not yet been disclosed.

THE CANADIAN Department of Defense has awarded a contract to the Port Arthur Shipbuilding Co. Ltd. of Port Arthur, Ontario for a 190 ft 3600 hp diesel driven ice breaker.

A CONTRACT has been placed with Gladding Hearn Shipbuilding Corp. of Somerset, Mass. for construction of a welded steel fishing boat 38 ft long 12 ft beam and 6 ft depth, for Edward M. and Thomas F. Conlon of East Providence, R.I. The boat which will carry 40,000 lbs of fish will be powered by a General Motors 4-71 diesel with 3:1 reduction gear driving a 3-blade propeller. Delivery is expected in late August.

THE STATE Prison Farm at Leesburg, N.J. has purchased two 150 kw diesel driven generating sets from Griffin Equipment Corp. of New York. The engines are General Motors, Model 62-406.

SANSON Construction Company has purchased a General Motors Model 2055 diesel from Diesel Engineering & Equipment Company of Woodbridge, N.J. for repowering a crane.

A PORTABLE pile driver owned by Frankie Foundation of New Jersey will be powered by General Motors Model 4031C sold by Diesel Engineering & Equipment Co. of Woodbridge, N.J.

GRIFFIN Equipment Corp, marine and industrial distributors of Detroit Diesel Engine Division of General Motors Corp., has sold to the American Ligurian Co., exporters of New York City, a 100 kw generator set driven by a General Motors Model 62406 RD.

THE White Diesel Engine Division of White Motor Co. has sold a Superior Marine diesel Model 40-SX-6 rated 270 bhp at 750 rpm, but actually capable of delivering 350 hp at 900 rpm, to repower the fishing boat *Lawrence Scola* owned by Lorenzo Scola of Portland, Maine. The reverse-reduction gear is a Snow-Nabstedt with a 2:1 ratio.

THE NEW York Branch of the White

Q• What's the best way to reduce **CRANKSHAFT VIBRATION?**

A• with a **TORSIONAL VIBRATION DAMPER** by **HOUDAILLE**

The shearing action of highly viscous fluid, used exclusively in Houdaille's damper, makes it the *most practical, most efficient* method of reducing torsional vibration in diesel engine crankshafts. Because it is a true damper...not a detuning device...it is equally effective across the full range of engine criticals.

A Houdaille Torsional Vibration Damper permits diesel engine builders to design for greater horsepower and speed. For users of diesel engines, a Torsional Vibration Damper assures smoother operation at all engine speeds, longer life, and less maintenance.

● Simplicity in design and construction makes the Houdaille viscous damper unequalled in performance and durability. There are only three essential parts in the completely sealed unit.

← **A** Inertia mass or flywheel
← **B** High viscosity synthetic fluid
← **C** Hermetically sealed housing

HOUDAILLE ENGINEERS are at your service in designing a viscous vibration damper to meet the individual requirements of any engine, large or small. For further information and full details of performance and installation, write Department DPR.

HOUDAILLE INDUSTRIES, INC.
BUFFALO HYDRAULICS DIVISION
537 East Delavan Avenue • Buffalo 11, N. Y.
Pioneers in vibration dampers for railway, marine and industrial diesels

Diesel Engine Division of the White Motor Company has sold three Model 40-SX-6 Superior diesels to the Corps of Engineers at Buffalo, New York for projects associated with the St. Lawrence Seaway. They will drive Ideal generators of 350 kw output. The radiator cooled electric started units will be located in three separate plants, two on land and one on a floating barge. The Model 40 makes a compact generator set measuring only 196 in. in length complete.

A Cummins diesel Model HRBI-600, 165 hp, has been sold by the Cummins Diesel Engine Co. Inc. of Philadelphia to the Alan Wood Steel Company of Conshohocken, Pa. to power an Orton Locomotive Crane.

BEAN, Incorporated of Easton, Pennsylvania has just purchased a Model HRCIP-400, 110 hp Cummins diesel to power a Northwest shovel. Cummins Diesel Engines, Inc. of Philadelphia, Pa. made the sale.

THE Cummins Diesel Engine Sales Corp. of Albany, New York has sold a Cummins power unit, Model NHRPS-600 rated 300 hp to the Adirondack Hardwood Co. of Newcomb, N.Y. to power a sawmill.

A. S. WIKSTROM of Skaneateles, N. Y. has purchased a Model NRTO-6-M Cummins Turbodiesel of 335 hp to repower a work boat on the St. Lawrence Seaway project. The sale was made by Cummins Diesel Central New York, Inc. of Syracuse, N.Y.

DELLA Bitin-Bassolh of Plantsville, Conn. has added a Caterpillar diesel driven P & H shovel, Model 655 BLC for use in their construction contracting work. The sale was made by Casey-Gessner of Hamden, Conn.

THE Waterbury Sand & Gravel Company of Waterbury, Conn. is now using a new P & H shovel Model 655 B, driven by a Caterpillar diesel, sold by Casey-Gessner Equipment Corp. of Hamden, Conn.

DuPont Personnel Changes

The appointment of W. Samuel Carpenter, 3rd, as director of sales of DuPont's Petroleum Chemicals Division succeeding David H. Conklin, who becomes managing director of the Du Pont Company (United Kingdom) Limited, was announced recently. The appointments were effective April 1. Other personnel changes in the Petroleum Chemicals Division resulting from the promotions are: Alfred R. Mullis, Eastern regional manager, will replace Mr. Carpenter as assistant director of sales. Earl G. Bennett, now manager of the Central region, will become the new Eastern regional manager. Donald W. Frison, manager of the Mid-Continent region, will move into the Central region post vacated by Mr. Bennett.

Charles D. Towery, manager of the Gulf Coast region, will take over the management of the Mid-Continent region in addition to his present position. R. Carter W. Jones, sales promotion manager of the Petroleum Chemicals Division, has been named to the new position of sales service manager. He will be responsible for the operations, sales promotion, export sales, office, and general sales sections. Harold C. Thompson, who is now assistant sales promotion manager, will succeed Mr. Jones as sales promotion manager.

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GM DETROIT DIESEL PARTS

—factory-engineered for long life, low-cost service

SHADOWGRAPH CHECKING is one of the precision tests that assure highest quality of factory-engineered GM Detroit Diesel original and replacement parts. In this photo, a magnified piston ring groove is compared with a perfect standard graph. This precision control is important to piston lubrication.

Scientific packaging of GM Detroit Diesel parts assures protection both in shipment and storage.

You're always money ahead when you buy factory-engineered GM Detroit Diesel parts from your Distributor or Dealer

GM DIESEL POWER

DETROIT DIESEL

Engine Division of General Motors • Detroit 28, Michigan

Midwest Diesel News

By **L. H. Houck**

READY for big road jobs ahead is the new Galion T-700 road grader now in production. Said to be the world's biggest, heaviest and most productive, it is powered with a 190 hp Cummins diesel and has a Grade-O-Matic drive which uses a GM-Allison torque converter and power shift transmission. The torque converter multiplies the engine torque up to 340 per cent automatically and the new Grade-O-Matic drive is reported to be a big aid to the operator in achieving top grading performance.

BROWN & Lambrecht Earthmovers, Joliet, Ill., have added three Caterpillar DW21's and No. 470 Lowbowl scrapers to their fleet. They are important contractors in the Chicago area.

A NEW engine for off-the-highway vehicles has been developed by General Motors, Detroit Diesel Division. It is a 375 hp unit, 6 cylinder, 2-cycle, Series 110, with turbocharger. It was developed for uses which require high horsepower in comparatively light weight power plant.

GLENN Seaborn, Seaborn Oil Co., Louisburg, Kans., has installed a GZB Waukesha gas engine for pumping gas into the pipelines, from AAA Eng. & Electric Co., Kansas City, Kan.

AUSTIN-Western, Baldwin-Lima-Hamilton, have a new push-button controlled diesel-electric gravel plant in production. All plant components except jaw and roll crushers are electrically operated in a closed circuit plant with individual electric motors. Ten Mid-West dealers have the new rig in stock.

A NEW Marion 101-M dragline to Vinyard Coal Co., Equality, Ill., powered with a Cummins 600 hp diesel, to be used for removal of overburden in strip coal mining operation, from Ryan Equipment Co., St. Louis.

DAVIS Const. Co., Boonville, Mo., has taken delivery on an Allis-Chalmers HD-6-G with AC (Buda) diesel from Cooke, Sedalia.

RYAN Equipment Co., St. Louis, has delivered a Marion 35-M to Big Three Coal Co., Cambria, Ill., for use in stripping. Power is Caterpillar diesel.

FARLEY Bros. Coal Co., Herrin, Ill., has purchased a Marion 35-M shovel to be used to load railroad cars at the mine. Sale was made by Ryan Equipment Co., St. Louis and engine is Cummins.

AAA ENGINE & Electric Co., Kansas City, Kan., has delivered a 50 kw light plant, powered with a Waukesha 135 GZB engine adapted for natural gas to St. Thomas Hospital, Colby, Kan., to be used for standby equipment.

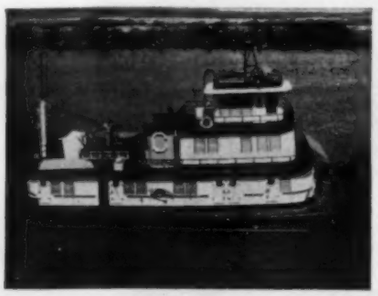
SAWMILL of Earl Anderson, Pequot Lakes, Minn., has been repowered with a 95 hp, Model J-6-P Cummins, which was sold by Cummins Diesel Sales Corp., Hibbing, Minn.

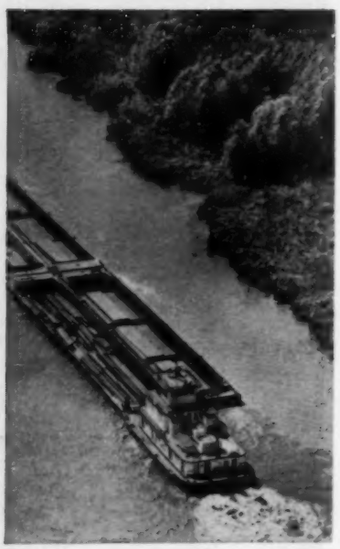
SCOTT County Highway Dept., Benton, Mo. has taken delivery of a D-230 Allis-Chalmers power unit which uses the new Allis-Chalmers (Buda) diesel engine, for use in an Austin-Western gravel plant. Sale was made by Ryan Equipment Co., Sikeston, Mo.

VOGEL Const. Co., Indianapolis, Ind., has put two new Marion 43-M's in service, both powered with Caterpillar engines. Flesch-Miller Tractor Co., local dealer, made the sale. The 43-M is a 1-yd machine as a shovel and up to 1¼ yds as a dragline.

LEO BORDERSON, Florence, Mo., has bought an Allis-Chalmers HD-11 and

Where performance is the measure
F-M Power is the standard





Coyle Lines Incorporated
STANDARDIZES
on Fairbanks-Morse opposed piston power

With the launching of the *M/V Dallas*, Coyle Lines bring their fleet of towboats to 11, totaling over 15,000 hp. Like the *Dallas*, all boats in the fleet that were built recently are powered by Fairbanks-Morse Opposed-Piston Diesels.

More power. Increased speed and maneuverability. Proved low maintenance. In fleet after fleet where this is the measure of performance for big-time barge handling, the standard is F-M Opposed-Piston Power—dependable power, produced economically. Fairbanks, Morse & Co., Dept. DP-5, Chicago 5, Ill.

FAIRBANKS-MORSE
a name worth remembering when you want the BEST

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY
PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS

dozer from Cooke, at Sedalia, for use in pond excavation and farm terracing work.

JACK McCULLOCH, Lebanon, Mo., and H. E. Austin, Mountain Grove, Mo., each purchased an Allis-Chalmers HD-11-B for use in farm grading and pond work. Chiles, Springfield, made the sale.

IRVIN NEEMEYER, Columbus, Neb., has installed a Cummins 110 hp Model HRIC-400 on an 8-in. Fairbanks-Morse centrifugal pump used for irrigation purposes. Cummins Mid-West Co., Inc., at Omaha, made the sale.

CLOSE Hatchery, Springfield, Mo., has installed a Waukesha Enginator, 60 kw, converted for natural gas as standby equipment for its large hatchery operation. W. J. Hewitt, AAA Eng. & Electric Co., Kansas City, Kan., made the sale.

BRANDEIS Machinery Co., Louisville, Ky., with branches in Mt. Vernon, Ill., Paducah, Ky., and Evansville, Ind., has added the Warner & Swasey Gradall to their line of equipment.

NEW P & H 287C-18 diesel is used in the new P & H Model 155WC 10-ton wagon crane now being shipped to dealers and buyers. The new crane features short turning radius and simple hydraulic controls, planetary boom hoist and all welded construction.

TRI-PAR Oil Co., Saukville, Wis., has powered an existing truck with a 175 hp JT-6 Cummins Turbodiesel from Cummins Diesel of Wisconsin, Inc., Milwaukee.

P & G Gasket Guides

A new product called Gasket Guides, designed to simplify gasket installations, has been announced by the P&G Manufacturing Company, Portland, Oregon.

The new Gasket Guides are claimed to help shops and mechanics three ways:

First, they hold pan and gasket together in perfect alignment. Second, pan bolts are suspended in each hole, ready for speed wrench tightening. Third, bolt threads are sealed to prevent oil seepage.

Gasket Guides are simply thin-walled plastic sleeves, flanged at one end, like little topless tophats. One is placed in each bolt hole from the gasket side, while the pan bolt is inserted from the pan side. This exactly aligns the gasket with the pan (or plate, or cover), and holds the gasket tightly in place regardless of the juggling necessary to get the pan into position. Gasket Guides are left in place. They become a permanent part of each gasket installation. In this way they serve also as bolt holders and thread sealers—because bolts can be quickly pre-assembled at the bench, with the Gasket Guides suspending and centering them for rapid speed wrench tightening. As the bolts are tightened the plastic Gasket Guides are compacted around the threads, forming a perfect seal. This eliminates oil seepage and spotted garage floors.

Gasket Guides are available in sizes to fit nearly all passenger cars ($\frac{1}{4}$ in. and $\frac{5}{16}$ in.), and most trucks, tractors, and industrial engines ($\frac{3}{8}$ in. and $\frac{7}{16}$ in.). Each package contains 26 Gasket Guides, and 18 packages are mounted on each attractive four-color display card. Packages retail for 29¢ each, with the usual dealer discount to apply. Gasket Guides are also available in bulk lots of 50 bags, 100 bags, and 250 bags. Gasket Guides are another development from the makers of the P&G Valve-Gapper and the P&G Cam-Chek—specialized automotive test instruments. Additional information may be obtained from the P&G Manufacturing Co., 305 N.E. Russell St., Portland 12, Oregon. (ITS NEW)

CLIMAXING 50 YEARS OF BETTER GEARS

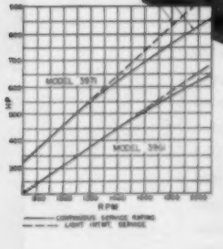
SNOW-NABSTEDT

proudly presents 2 new Marine Reverse Reduction Gears

Engineered to Transmit the Maximum Power of Modern, High-Speed, Heavy-Duty Diesel Engines

More Power for Every Type of Boat

The new S-N 3900 Series hydraulically actuated gears are designed especially for high-speed, heavy-duty diesel engines from 200 to 800 horsepower. They embody the most advanced features and are engineered for maximum dependable power. Whether you are a single boat or fleet operator, marine distributor or engine manufacturer, you will want all the facts on the 3900 Series for new installations and for repowering. See your S-N distributor or write direct for further information.



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"MAKERS OF JOE'S GEARS"
THE SNOW-NABSTEDT GEAR CORP., HAMDEN, CONN.

50TH ANNIVERSARY S-N GEARS FIFTY YEARS OF BETTER GEARS

Diesel Farm Notes

By **F. Hal Higgins**

Canada's agriculture is trending upwards to diesel, according to the Jan. 1957, review of 1956 power farm machinery sales in the Dominion. Approximately 22% of all tractors sold in Canada for farming last year were diesel. The heaviest demand was for the 28-34 hp size in both eastern and western provinces.

Of these diesels sold in Canada, 5690 diesel tractors were sold for farming. Manitoba, Saskatchewan and Alberta took the lion's share of agricultural diesels. As 1955 diesel sales in Canada were 3,555, the increase was over 60% for the more economical power and a tribute to the cost-cutting importance of the diesel compared to gas power in tractors. Saskatchewan was the biggest buyer of diesel tractors, taking 2,154 wheel and an even dozen crawlers. British Columbia was the big buyer of crawler diesels with 237. Since 165 of these track type diesels were over 35 hp, some of them probably went into the woods, though the statistics are given by Canadian Farm Implements as for farm tractors.

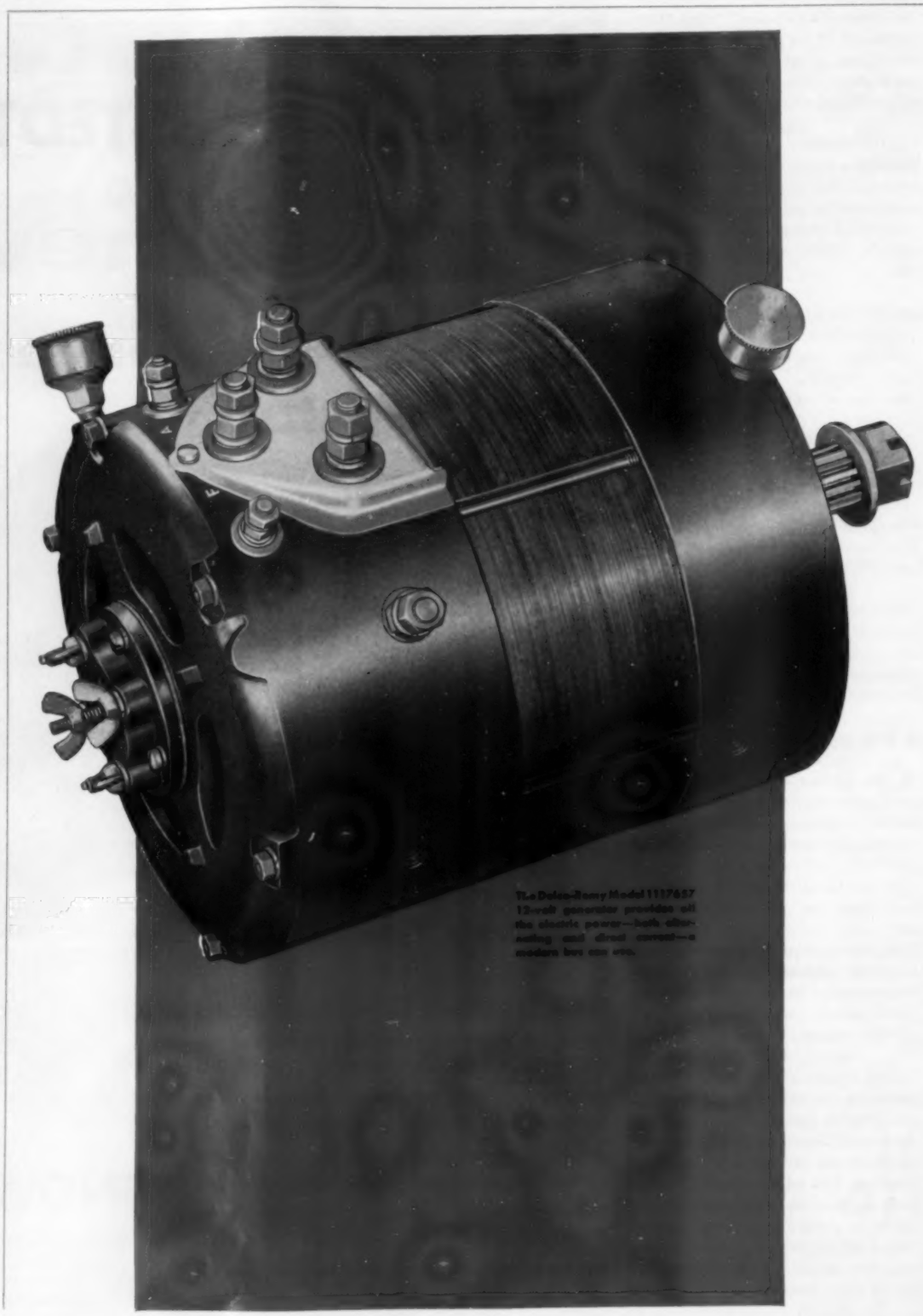
Interesting enough to show this trend to diesels is the fact that total Canadian farm tractor sales were down from 1955 by 3.5%. Canadians contacted at the National Road Show in Chicago confirmed this trend and expect 1957 will continue this trend both to diesels and to increased industrial sales. President John Q. McDonald of Caterpillar Overseas, who has just had Canada added to his world domain, told the writer he expects a great year for Canada in diesel tractors and dirt moving machines for mining, road building, logging and development of the many great projects now under way and planned.

200 "Supergiant" mechanical refrigerator cars are now coming off the line and being accepted by Pacific Fruit Express to meet the booming demand of western fruit and vegetable growers for faster transportation for their products to the big long-haul markets in the east. General Superintendent Gus Torburn of PFE accepted the first of the 200 ordered late in January this year. They are now coming off the line at the rate of three a day in the $4,400,000 program. The cars cost $22,000 each and are powered by GMC diesels hooked up to Frigidaire units. The diesel industry can take pride in this revolution in handling farm crops that has lifted California's agricultural income to an all-time high last year and further cinched this state's position as No. 1 farm income state.

Canadians were given a look at the 12-ton "Wonsover" that cultivates, plants, fertilizes, kills bugs and weeds, subsoils and packs all at one pass at the recent Canada Farm and Industrial Trade Show at Toronto. This combination machine is both diesel pulled and powered. Cost estimate is $37,000, though whether it will ever get into production is still a question. But with the Ontario farm implement dealers meeting at the same time and place, plenty of diesels were on exhibition for both dealers and farmers to study.

A Wagner DM18 model tractor 3 has gone to work on the Silver Bell copper mine in Arizona. The Wagner is powered by Cummins engines in all sizes and models of tractors. The bigger model Wagner DM24 is working at the Bagdad Copper mine. Wagner's distributor for Arizona, Arizona Equipment Sales, Inc., put out several Wagner tractors for farming last year.

Stubenberg Company, Limited, Honolulu, Hawaii, has heavily dieselized the sugar cane industry's farming with its crawler tractor-carried planters, fertilizer distributors, rakes and harvesters. International TD9s, 18s, and 24s and Cat

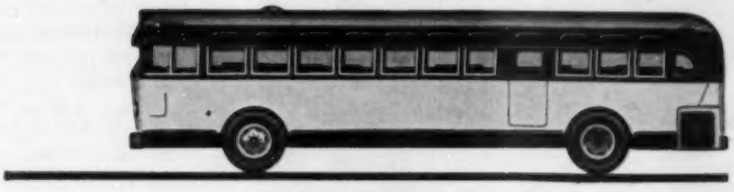


The Delco-Remy Model 1117657 12-volt generator provides all the electric power—both alternating and direct current—a modern bus can use.

D6s and D7s are the power units on which Stubenberg has hung his special sugar cane machines to lift the industry to high level competition with western U.S. beet sugar farming.

Deere & Co. branch officials back from the National Road Show report their demands for diesel tractors for industrial work forcasts a big 1957 in the California and other far western areas.

California sugar beet growers have been handed an acreage increase of 11.7% to lift this state's percentage of the U.S. sugar beet acreage to 21.5% of the national acreage for this crop. California sugar beets are a 100% diesel tractor crop from seedbed to harvest. International Harvester, Allis-Chalmers, Oliver, Caterpillar, crawler tractors, and wheel diesel tractors for row crop work of the first three companies mentioned as well as Ford, Deere, Massey-Harris-Ferguson, Minneapolis-Moline and David Brown all will furnish new diesel tractors for the increased beet acreage that stretches from the Imperial Valley's Mexican border to far up the Sacramento Valley above Marysville. Then, in motor trucks for transportation of sugar, Cummins, GM, Hercules and Waukesha furnish the engine power. In the irrigation of the beets, some diesels are found though most irrigation pumping in these areas is electric high line power. But in the river traffic much beet pulp and sugar goes down the Sacramento by boat with diesel tugs handling the barges.



ASK FOR DELCO-REMY MODEL 1117657—THE GENERATOR THAT HANDLES THE TOUGH JOBS WITH EASE!

This Delco-Remy 12-volt generator—Model 1117657—is the heart of an A.C.-D.C. charging system designed specifically for buses with continuous and extremely heavy electrical loads. It has a low cut-in speed of about 550 rpm, a curb-idle output of 130 amp., and a maximum output of 180 amp. at approximately 2000 rpm. Physically, it is rugged yet extremely low in weight for such a tremendous output. With its matching regulator and rectifier, Model 1117657 will give you all the power a modern bus can use—alternating current for fluorescent lighting, plenty of direct current for other electrical equipment. Specify Delco-Remy A.C.-D.C. charging systems for your buses. They're typical of Delco-Remy leadership in the automotive electrical field.

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Flexible Connectors Bulletin

A new illustrative Flexon Flexible Connector Bulletin #158 has just been released by Flexonics Corporation, Maywood, Illinois. This bulletin offers complete information on how to absorb vibration, dampen noise, reduce piping failure, and prevent leakage. Material specifications, pipe sizes, and fitting connections are shown as well as operating pressures and maximum off-set allowed. A diagram showing proper installation procedures is pictured. For your copy, please write Flexonics Corporation, 1325 South 3rd Avenue, Maywood, Illinois, requesting bulletin #158. (ITS NEW)

Transcon Expands

Transcon Lines has placed 43 additional White-Freightliner highway tractors, powered with Cummins diesels, in service on its 7,000-mile system, announces the company's president, Scribner Birlenbach. In 1955 the company put 70 of the custom made tractors into operation after road-testing a prototype model over 250,000 miles of actual fleet operation. These lightweight White-Freightliner tractors are manufactured to rigid Transcon specifications for maximum payloads and safe, economical operation, Birlenbach said. The single drive (pusher) tractors with deluxe sleeper cabs weigh only 11,200 lbs and pull 35-ft trailers within the 45-ft overall length limitation. Payloads are 38,000 lbs with a 60,000 GVW.

Birlenbach also stated that the trailers used with the White-Freightliner equipment are specially built to company specifications and include an exclusive device making it possible for loads to be adjusted at state boundaries to comply with individual state size and weight laws. Wilson D. Patterson, vice president and Pacific Coast regional manager of The White Motor Company, reports that the delivery of the 43 White-Freightliner units plus the original 70 makes Transcon Lines the second largest user of these Portland-built tractors. Transcon Lines, with headquarters and terminal facilities in Los Angeles, is a publicly-held company employing 785 persons with an annual payroll of $4,500,000. Other major terminals are in Oklahoma City, Oakland-San Francisco, Kansas City, Tulsa, Wichita, Fort Smith, Little Rock, Chicago and Memphis.

Florida Diesel News

By Ed Dennis

THE MODEL 40-C-S-6 Superior installation in a new 4500 Manitowac dragline, now operating deep in the Everglades, is the first of this type in the South. This 8½x10½ Superior rated 360 bhp at 900 rpm and manufactured by the White Diesel Engine Division is expected to dig 200,000 yds of rock and muck a month.

RIGGED for Campechee shrimping, the *Miss Aletha* was launched for Russell and Middleton of Kingsland, Ga., powered with a General Motors 6-110 diesel and Allison r&r gears plus a model 32DSP 3 kw Onan diesel generating set from Diesel Engine Sales, St. Augustine, who also launched the 67 ft *Miss Emmy* for the Camden Co. of St. Mary's with similar propulsion.

A Nordberg model 4-FS-1, to drive a Gardner-Denver air compressor, radiator cooled, rated 10 bhp at 1200 rpm, installed in Pumping Station #9, for the Florida Flood Control project.

THE 57 ft yacht *Stormy III* being built at Broward Marine Inc., Ft. Lauderdale, for Mr. Daniel G. Van Clief of Virginia, will be powered with two General Motors 6-71 diesels and Allison 2:1 marine gears plus an Onan 3 kw diesel generating set. It was designed by John H. Wells.

AT OCALA, for the Marion Construction Co., an HD 15 Allis-Chalmers Buda dieselized tractor to pull a Seaman Pulvi mixer powered with a GM 4-71 for hiway construction on State Road #17.

AT BARTOW, the Murphy Associates, took delivery of a model 8DAS 1125 supercharged Buda diesel with a max. hp of 350 at 2100 rpm, for the pumping engine in a dredge plus a model 6DA-273 Buda rated 79 hp at 2100 rpm for auxiliary use.

SHELLEY Tractor & Equipment Co. of Miami repowered a 67 ft shrimper belonging to Joe Thompson of Key West, with a Caterpillar model D342 marine diesel which has a max. output of 210 hp at 1225 rpm and a D337 Cat was installed in a tug for the Colusa Shell Co. of Fort Myers. The tug is used in barging shell around the Fort Myers area for road construction work.

THE CITY of Jacksonville took delivery of a Huber-Warco road grader powered with a model JM6BI Cummins diesel rated 125 hp. This model 6D2 grader has a combination of torque converter and full power shift transmission.

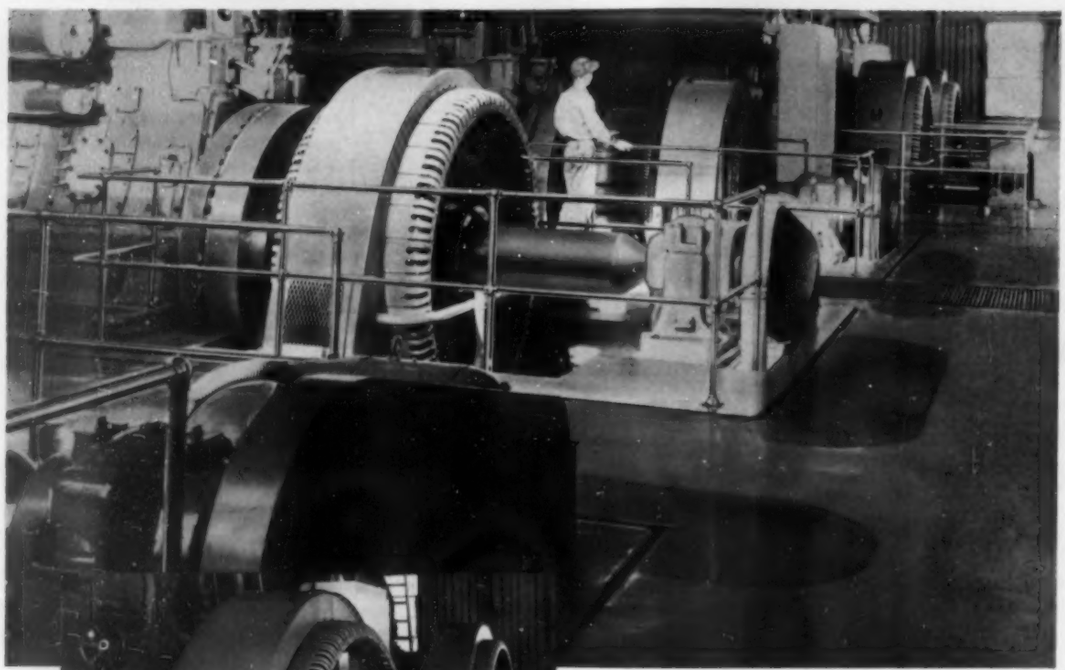
ELLIS Diesel Sales & Service in Ft. Lauderdale installed a six cyl. series 71 GM diesel in the pusher tug *Becky* of Ft. Lauderdale while at the East Coast Bottle Gas Co., Dania, a model 6-028-C (6-71 General Motors industrial) with a GM power take-off was installed to run compressors for bottling gas.

A 6 cyl. International UD16 diesel, rated 100 hp with power take-off and V belted to drive a Couch turbine 24 in. pump, rated 10,000 gpm at 30 ft head, being used in the construction of Station #9 Florida Flood Control project; plus a RD264A12 Ready Power 20 kw generating unit with a UD264 International diesel.

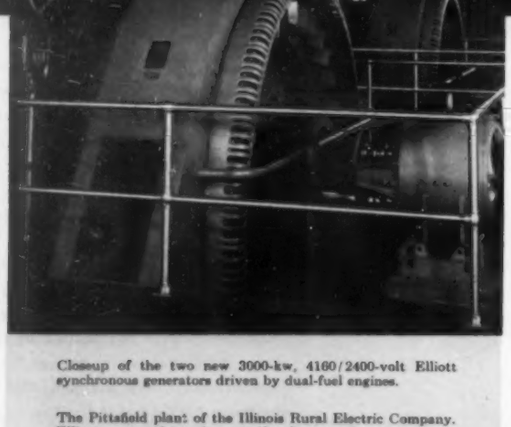
AN Oliver 4 cyl. diesel drives the model D1612B Universal generating unit installed on a Manitowac dragline, 110-120 volt 83.4 amps 60 cycle. It also drives a Gardner-Denver ADK1002 air compressor. This dragline is being used on levee construction work in the Everglades by the James P. Cross Co.

THE CITY of Stark Light Plant is probably the only municipal generating

efficient and economical power . . .
with ELLIOTT engine-driven generators



Five Elliott synchronous generators (exciter of unit in foreground is visible) deliver 9220 kw for the Pittsfield plant of Illinois Rural Electric Company. Note how the stator in the second unit from the left is shifted for routine inspection.



Closeup of the two new 3000-kw, 4160/2400-volt Elliott synchronous generators driven by dual-fuel engines.

The Pittsfield plant of the Illinois Rural Electric Company. Elliott motors drive the centrifugal scavenging compressors in this plant.

Wherever ELLIOTT generators are in service, they demonstrate superior performance as well as worthwhile economies both initially and in annual operating costs. At the Pittsfield plant of the Illinois Rural Electric Company, illustrated on this page, three Elliott 1450-kva, 360-rpm generators were installed in 1950. Two Elliott 3750-kva units were installed more recently. In addition, five Elliott generators also serve the company's Winchester plant. Here are some of the features which have resulted in the popularity of Elliott engine-driven generators:

- Designed for trouble-free operation
- Custom-built for specific requirements
- All-modern, Fabri-steel construction
- All-welded steel stator frame for high strength
- All-welded rotor withstands torsional vibration
- Accessible for routine cleaning

Write for Bulletin PB 1400-3

ELLIOTT Company

Ridgway Division Ridgway, Pa.

E7-7

plant in Florida that has an excess of power to spare, due to the recently installed five model 80 Superior diesel generating units each rated 1000 kw. The city's max. peak load is only about 3000 kw.

RECENT JT6B Cummins diesel installations around the Jacksonville area for hiway transportation were made in an International tractor for Chandler Feed & Grain Co. and one in a White tractor belonging to William Witcher. These are the 6 cyl. 4⅛x5 in. diesel engines with a horse power rating of 175 at 2500 rpm.

THE CITY of Sebring will receive two 8 cyl. Fairbanks, Morse diesel generating sets, 2800 hp each, for the municipal light plant.

A MODEL HD260 Continental 4 cyl. diesel with a horse power rating of 59 at 2000 rpm and an Allison torque converter was in the Galion road roller that was delivered to the Naranja Rock Company at Naranja, Florida.

THE PALM Beach Ferry, Inc., established in 1891, had a General Motors 4-71 diesel with a Borg-Warner 1.5:1 rdr gears, installed in their 57 year old *Jungle Goddess*. She is a 45x9, sightseeing vessel and fuel consumption dropped from 10 gallons of gasoline to 3 gallons of fuel oil or a saving of $14.40 per trip and a similar installation was also made on their *Lu Du Berry*.

THE Peninsular Armature Works, sold to the Ft. Lauderdale Water Works, for their Prospect Plant, a model 6DA799 Buda diesel rated 185 max. hp at 2100 rpm and a Twin Disc power take-off to drive a Peerless 2000 gpm water pump. Installation included a Hydrotor CM2 starter.

ANOTHER Menhaden fishing vessel for the Gulf service was launched. The *Dixie*, a twin screw 110 ft vessel is powered with General Motors 6-110 tandem diesels capable of delivering a max. hp of 1200. Included were GM power take-off and Falk 4:1 rdr gears and two 5 kw Onan diesel generating units and a Petter diesel engine for the air compressor. The *Dixie* is owned by the Dixie Menhaden Sales Co.

THE Seventh Annual Conference, South Atlantic Region Propeller Club of the United States will hold their annual convention in Miami at the Mc Allister Hotel May 2nd, 3rd and 4th. Plan to attend.

Cummins 1956 Annual Report

Cummins Engine Company, Inc. recently released their 1956 Annual Report and here are some of the important points brought out in the report. Net Sales: $105,793,070 (up $24,763,663 or 30.6% over 1955). Net Income: (after taxes) $5,703,375. New products introduced in 1956 included four more turbocharged engines; the NT-4 (165 hp), the NRTO (335 hp), the horizontal NHHT (250 hp), and the horizontal NHHRT (300 hp). The first models of a new family of eight cylinder V-type engines were readied for testing in late 1956 and are now being thoroughly field tested in selected locations to obtain experience in varied operating conditions.

During 1957, the Company plans to carry out a major expansion program which has been designed to increase very substantially the capacity for producing components now machined on the outside. In addition, a three-story extension to the office will be erected. It is anticipated that gross capital additions for the year 1957 will total about $12,000,000. Ten Cummins domestic distributors acquired land for new buildings and, at the end of 1956, new buildings were under construction in five locations.

This report of an excellent year for Cummins, and their ambitious plans for 1957 in expanding to meet the growing demand for diesel engines, testifies to the great strength and potential of our diesel market today.

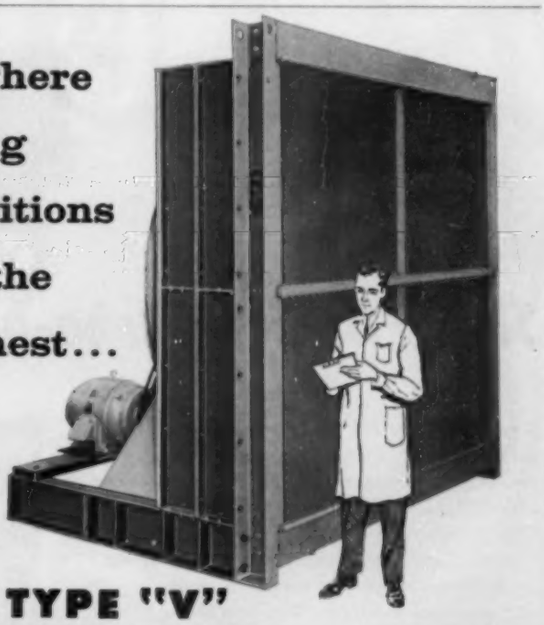
Bradshaw Promoted At DeLaval

Mr. C. B. Schmidt, President of The De Laval Separator Company, has announced the appointment of Mr. H. B. Bradshaw as General Manager of the Company's Midwestern office located in Chicago, Illinois. Mr. Bradshaw became associated with De Laval in 1940 as a salesman in the Dairy Division. Later he was promoted to Manager of the Milker Service Department in the Chicago office, where he spent much of his time in the promotion and development of the Company's Combine Milker equipment. In 1951 he became District Sales Manager of the Dairy Division, the position he held until his new appointment.

Service Tools for GM Diesels

Service tools for Detroit Diesel's new four-valve cylinder heads have been announced by Kent-Moore Organization, Inc., Jackson, Michigan, designers and manufacturers of special service tools. There are six tools required for complete service maintenance on the new four-valve head as follows: 1. Valve Seat Insert Remover, which automatically locates the correct depth for gripping the hardened steel insert and permits easy removal. 2. Valve Seat Insert Installer, which eliminates chance of damaging the cylinder head or the insert. 3. Valve Guide Remover, designed with a pilot end fitting down in the guide and automatically centering the tool when driving the guide from the cylinder block. 4. Valve Guide Installer, for automatically positioning the guide into the cylinder head and insuring factory installation tolerances without fear of damage to the engine. 5. Valve Spring Compressor, for compressing all four valves simultaneously while the keepers, valve springs, and caps are removed, thereby allowing the mechanic to have both hands free. 6. Valve Lash Feeler Gauge for checking valve lash on hot or cold engines and setting the adjustment to factory specifications.

(ITS NEW)



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Michigan-Ohio News

By **Jim Brown**

CUMMINS Diesel Michigan, Inc., has installed a model HBI-600 Cummins diesel in a GE 45-ton locomotive for Basic Inc. of Cleveland, Ohio.

MR. F. H. HILBORN of Pontiac, Mich. has purchased a Hough model HOD Payloader. The Payloader is powered by a Cummins JN-6-BI diesel and was delivered by Wolverine Tractor and Equipment Co. of Detroit.

TELFORD Equipment Company of Detroit has recently sold two model C Tournatractors to Holloway Construction Company of Livonia, Mich. The tractors are powered by 6-71 GM Detroit Diesels and will be broken in on a large highway relocation project (US 23) near Flint, Michigan.

LAPEER County Road Commission has accepted delivery on two Galion model T-500 Motor Graders. The motor graders are powered by Cummins diesels, and were delivered by Wolverine Tractor and Equipment Company of Detroit and Grand Rapids.

EARLE Equipment Company has delivered an Allis-Chalmers HD-6B tractor equipped with a Tractomotive front end loader to John C. Bellows, Inc. of Dearborn, Michigan.

CHEVROLET Grey Iron Foundry of Saginaw, Mich. have received three 35 kw GM Detroit Diesel standby generator sets. The generator sets were sold and delivered by Peninsular Diesel of Detroit.

MR. DAVE KILLANS of Dearborn, Mich. has accepted delivery on a new model LS98 Trenchhoe. The trenchhoe is powered by a Cat D318 diesel and was purchased from Michigan Tractor & Machinery Company of Detroit.

THE UNION Telephone Co. of Davison, Mich. has accepted delivery of a 60 kw Standby GM Detroit Diesel generator set. The generator set was sold by Peninsular Diesel Inc., of Detroit.

A. L. DYER & Sons of McBrides, Mich. has a new Caterpillar D399 diesel. The diesel was sold by Michigan Tractor and Machinery Co. and will be put to work on an oil drilling rig.

CUMMINS Diesel Michigan Inc., has installed a model JT-6-B Cummins in an IH truck for National Memorial Stone Co., of Defiance, Ohio.

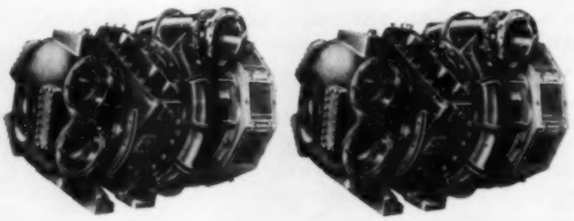
ANDERSON Excavating of Lansing, Mich. recently purchased an International Harvester model TD-9 crawler tractor equipped with a hydraulic bulldozer blade from Wolverine Tractor and Equipment Company of Detroit and Grand Rapids.

GREAT LAKES Steel Corp. has two new HD-11G Allis-Chalmers crawler tractors which will be used around their blast furnaces. The two tractors were sold by Earle Equipment Company of Detroit.

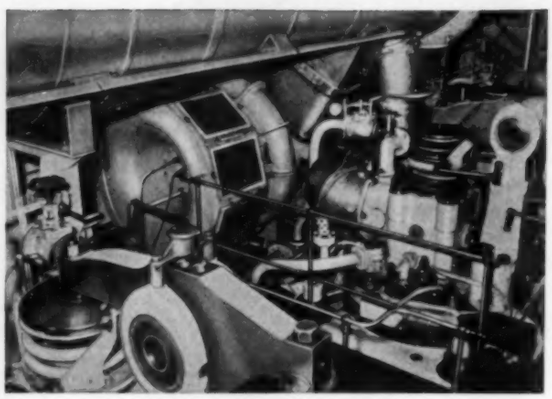
PENINSULAR Diesel Inc. is installing a GM model 3055C Detroit Diesel engine which will replace an older diesel in a model 304 Koehring shovel for Battle Creek Gravel Company.

THE GREAT Lakes Foundry Sand Co. has a new Caterpillar model D318 diesel which was purchased to power a wheel-type tractor. The sale was made by Michigan Tractor and Machinery Company of Detroit.

CUMMINS Diesel Michigan, Inc. has installed a model NHB-600 Cummins diesel in an LJ Mack truck for Mr. Lester Sheppard, a broker for Superior



These Napier Turbo-blowers were chosen



Two Napier Type MS 600 turbo-blowers are fitted to the Burmeister & Wain 6-cylinder single-acting two-stroke diesel engine which powers the Compagnie Maritime Belge (Lloyd Royal) M.V. LUSAMBO. This Burmeister & Wain engine was made under licence by S. A. Cockerill and Ougrée in Belgium. The ship is one of three which have Burmeister engines with *Napier* turbo-blowers. Why were *Napier* turbo-blowers chosen? Here are three good reasons:

- Napier blowers have *high adiabatic efficiency*, resulting in maximum power increase and low fuel consumption.
- Journal bearings on the MS 500 and 600 Napier blowers are sleeve type, and with proper lubrication they will last as long as the engine itself. The MS 500 and 600, the largest blowers in the Napier range, are built especially for marine applications.
- A high standard of workmanship is guaranteed by Napier's long experience in precision engineering.

Napier turbo-blowers are available in seven sizes for engines of 140-4,000 h.p. afloat and ashore. Multiple installations for engines of higher powers. On 4-stroke diesels they can double the power, on 2-strokes they increase it by over 30% —often at a lower specific consumption. Napier turbo-blowers are currently in use in 69 countries.

for this engine

which powers this ship

NAPIER Turbo-blowers

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Representative: L. O. Brooks, 909 Dupont Circle Bldg., 1346 Connecticut Ave. N.W., Washington 6, D.C. Phone: North 7-0146

Transport Company of Bay City, Michigan.

THE GRAND Rapids branch of Wolverine Tractor and Equipment Co. has delivered an International Harvester TD-6 tractor to Brink & Rabbers of Holland, Michigan.

KILROY Construction Company of Livonia, Michigan has accepted delivery of an Allis-Chalmers model HD-6G crawler tractor.

PENINSULAR Diesel Inc. has replaced a gasoline engine with a GM model 4058C Detroit Diesel engine in a Hough HO Payloader for Brehm & Franke, Inc. of Detroit.

SUPERIOR Transport Co. of Bay City, Mich. are having two of their LJ Mack trucks converted to diesels. Cummins Diesel Michigan Inc. is doing the job for them with two model NHB-600's.

OAK PARK Excavating Co. of Detroit has a new IH model TD-9 crawler tractor equipped with a hydraulic bulldozer blade. The unit was delivered by Wolverine Tractor & Equipment Company of Detroit.

GORDON SEL-WAY, Inc. of Detroit has accepted delivery of an Allis-Chalmers model HD-6B crawler tractor. The sale was made by Earle Equipment Company of Detroit.

EARLE Equipment Company of Detroit has recently delivered an Allis-Chalmers HD-6B tractor equipped with a hydraulic bulldozer to Marty Robinson of Evart, Michigan.

Gas Turbine Locomotives Purchased

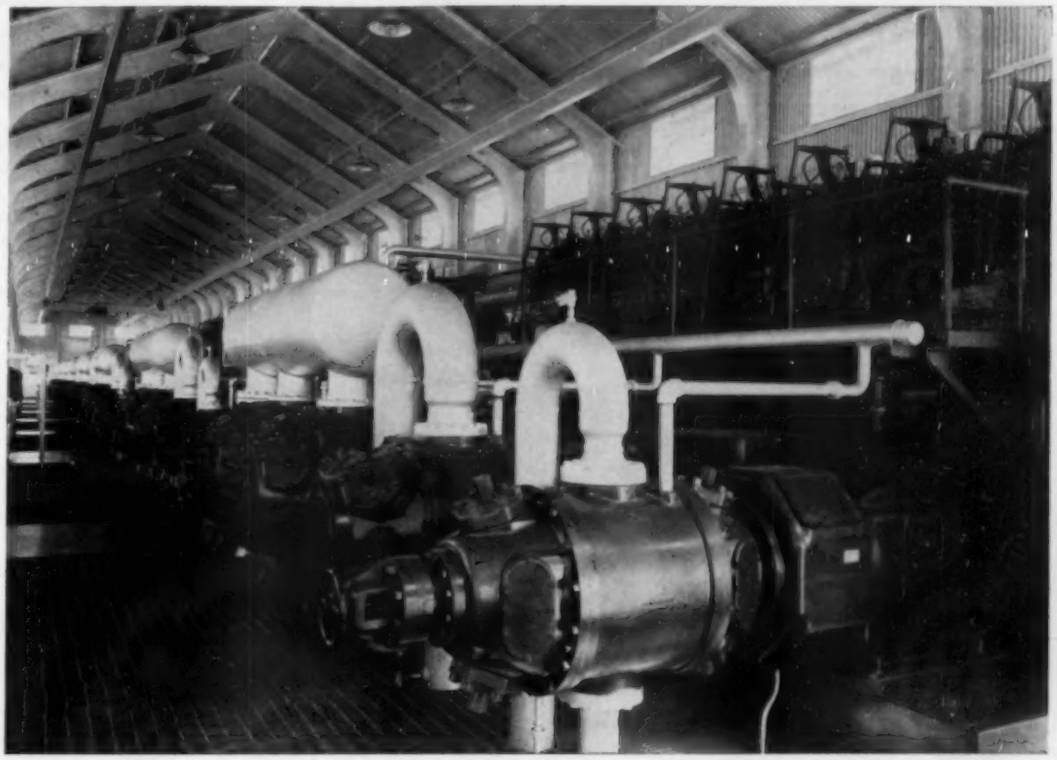
Union Pacific Railroad has ordered a second group of fifteen 8500 hp gas turbine-electric locomotives from General Electric Company, it was announced by Arthur E. Stoddard, the railroad's president. The first group of 15 was ordered in November 1955, delivery of which is scheduled to start in July of this year. Total cost of the second 15 locomotives will be about $15,000,000. Delivery expected to begin early in 1958. This new type locomotive will be the most powerful in the world, according to U.P.

A fleet of 25 smaller gas turbine-electric units rated at 4500 horsepower have been in regular freight service on Union Pacific for several years. Latest announced figures show that this relatively small number of units is hauling 10 per cent of U. P.'s total freight tonnage.

The new locomotives will be built in two sections permanently coupled together with an enginemen's cab at one end. Coupled behind the units will be a fuel tender of 24,000 gal. capacity, insulated to retain the heat of fuel which is heated as it is loaded. Use of the tenders gives the locomotives greater operating range without refueling and insures a constant weight on the driving wheels. Use of internal fuel tanks would result in a reduction of the weight of the unit as fuel is burned and a consequent loss of traction. The tenders will be built by Union Pacific. Geared for freight service, the locomotives will have a top speed of 65 mph. A total weight of 408 tons will be distributed on 12 axles. Over-all length with a fuel tender will be slightly more than 165 ft and height will be 16 ft.

COMING MAY 15! The Brand New **DIESEL ENGINE CATALOG,** Volume 22. This giant, 400 page, 10½" x 13½" fully illustrated reference book containing complete and detailed engine and accessory sections is the biggest and best yet. **SPECIAL OFFER!** If you send in your cash order on or before May 15, you will receive a 10% discount on the Catalog price, which means it will only cost you $9.00 postpaid plus California sales tax where applicable, instead of the regular $10.00 price. Send your cash order now to **DIESEL PROGRESS,** 816 N. LaCienega Blvd., Los Angles 46, California.

Look to COOK for Better Rings!

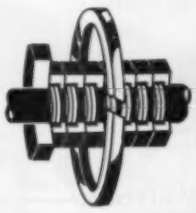


Cook packing and rings help keep compressors humming!

A well-known oil-producing company keeps this big lineup of Clark Bros. compressors running night and day in a West Texas gasoline plant. Keeps them running smoothly and efficiently, too — *thanks in good measure to C. Lee Cook packing and piston rings!*

Whatever type industrial equipment you operate, if it uses piston rings and packing, chances are good that it was Cook-equipped *when it was built.* That's why your best bet for continued trouble-free performance is to *keep it Cook-equipped.*

Your nearby C. Lee Cook representative will be glad to give you all the facts about precision-engineered Cook products. Why not talk with him soon? C. Lee Cook Company, 940 South 8th Street, Louisville 3, Kentucky.



C. LEE COOK COMPANY

A Subsidiary of Dover Corporation

Rings and Packings Since 1888

Diesel in Off-Highway Work

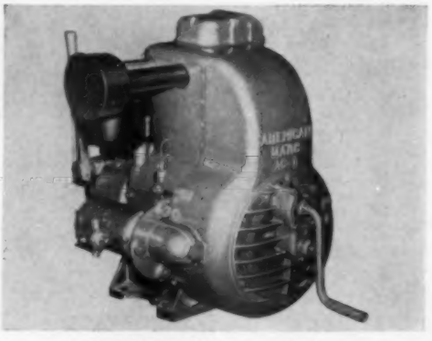
Getting ready for another load of rock — that's this International Harvester, Model 65 Payhauler, owned by L. S. Coleman Company, Charleston, West Virginia. The firm is operating this unit on a 12 mile round trip haul from a quarry to a job site on the West Virginia Turnpike. The Model 65 IH Payhauler is powered by a 262 hp Model NTO-6-BI Cummins Turbodiesel engine. The Charleston firm reports that the ease of handling and the bonus horsepower produced by the Cummins engine enables the unit to give outstanding performance.

American Marc Developments

After nearly a year of negotiation, American MARC Inc. recently acquired complete ownership and management as well as all real and improved property of the Diesel Engineering Division of the Hallett Manufacturing Company, 1601 West Florence Avenue, Inglewood, Calif. The move, announced by President W. Denis Kendall of American MARC, marks the entry of Arthur Vining Davis into the field of California industrial investment and infuses new blood into a key strategic

and commercial manufacturing category reportedly, placing American MARC in the position of the country's largest manufacturer of air-cooled diesels.

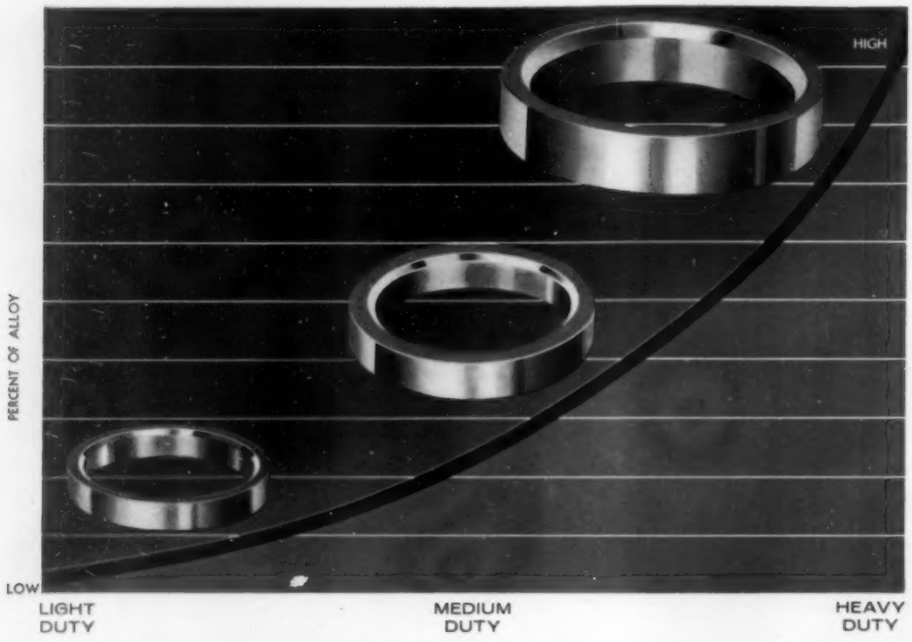
Mr. Davis, for decades almost legendary as an investor in Southern Florida properties, combines a portion of his other large holdings with the Inglewood Diesel manufacturing firm, since most of finished engines made by American MARC are cast from aluminum. Mr. Davis is chairman of the board of the Aluminum Corporation of America (ALCOA) and that corporation's largest individual stockholder. He is majority stockholder of American MARC, with approximately one million dollars invested to date. American MARC, says President Kendall, now lists nearly one thousand stockholders. Since American MARC's initial purchase of the Hallett company's designs and patents less than a year ago, streamlining and modernization of the plant has resulted in substantial prod-



6.5 hp Model AC-1, one -cylinder air-cooled, lightweight diesel.

uct improvement, and increased production and distribution. Concentrated research activities have kept pace with the rapidly-accelerating demands of the military for lighter, more compact, more powerful diesels as basic power for mobile and portable generators and allied units in the communications and electronic categories. American MARC reports that this policy has already resulted in the receipt of nearly three-quarters of a million dollars in contracts from the various branches of the armed services.

President Kendall has a long history of executive accomplishment both in this country and abroad, starting with the Budd Manufacturing Co. of Philadelphia and including Citroen Motor Car Co. of Paris, where he was director of manufacturing nearly thirty years ago. From 1938 to 1945 he was a member of the Committee of Five of Churchill's



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For heavy duty service involving extreme wear, corrosion, and oxidation, the highest performance high-alloy seat insert that can be produced is almost certain to be the most economical. On the other hand, for light duty service, a low cost insert of low alloy content may be adequate for the requirements. Eaton produces seat inserts "custom tailored" to meet the demands of each specific application — skillfully blends chromium, nickel, molybdenum, tungsten, cobalt, and iron to provide the right properties to overcome wear, corrosion, and oxidation. The result is inserts which will give optimum life at lowest cost, in the kind of service for which they are designed.

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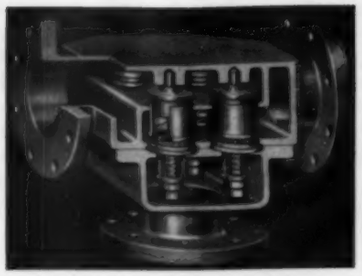
War Cabinet Production Board, in charge of the manufacture of British automatic weapons and ammunition. At the same time he was president and managing director of the British Manufacture & Research Company of Grantham, an armament and munitions firm; and from 1942 to 1950 he served in the House of Commons of the British Parliament, standing as the member from Grantham. From 1945 to 1955 he was consultant to and director of many large corporations in this country, including Mack Trucks (where he was also vice president operations), Carl Erbe Public Relations Associates of New York, A. M. Byers Company of Pittsburgh, N. Madison Cartwell & Associates of New York, and others. Late in the Fall of 1955 he accepted the invitation to be president and director of American MARC.

The basic products of American MARC Inc., are four high-speed, lightweight, low-horsepower diesel engines. Briefly, they are two one-and two-cylinder basic prime movers, each available in either air-cooled or water-cooled models. The air-cooled single-cylinder engine (Model AC-1) was the first to receive the new American MARC treatment and at 6½ hp shows a 1.5 hp increase over its former rating. This increase was attained through blower and camshaft improvements and with no increase in weight; similar modifications are being studied for the entire American MARC line, which includes marine engines, pumping units, electrical generating plants and other complete units. Many new uses for the versatile small American MARC Diesels are constantly being developed. A few are their employment on the *Texas towers* in offshore drilling, for small tractors, hospital standby electric plants, automatic and remote control navigational aids, refrigerated freight cars, and for various uses at jet airfields, where they can be operated on the same fuel as jet aircraft.

Busy Crawler

Flanked by heaps of rock and shale fragments which previously comprised blanket over coal seam, an International TD-24 torque converter diesel crawler tractor is shown dozing on access road near Parrish, Ala. This machine works 16 hours a day 6 days a week at various tasks, helping produce 500 tons of coal a day. In addition to maintaining haul roads, the unit, owned by J. H. Busby Coal Co., Parrish, also levels spoil banks.

Its primary job, however, is removing about 30 ft of overburden to the layer of rock and slate. A Koehring 1005 removes the latter covering to the 5 ft seam. A Lima 34 shovel then loads the blocks into 15-ton haul trucks.



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SAFETY Provided for by multiple independent elements as shown above.

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✓ Lack of capillary tubes, bulbs, and packing glands means no failures from kinks or leaks.

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MODELS ½" to 6" pipe sizes. Larger sizes in iron, bronze or ductile iron.

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Gulf Coast Diesel Notes

By Michael T. Pate

DILLARD & Walter Mire Drilling Company, Houston, through its agent, Walker Neer Machine Company, Wichita Falls, Texas, secured three model VLR DBU Waukesha diesels, rated 767 hp each at 1100 rpm, to power a drilling rig. The diesels were sold by Waukesha Sales & Service, Inc., Houston, and equipped by them with National torque converters.

HIGMAN Towing Company, Orange, Texas, has bought two 8-cylinder, model 38F5¼ diesels, rated at 600 hp each, from the Diesel Division, Fairbanks, Morse & Company. The diesels will power deep-water tugs.

KGUL-TV, Galveston, Texas, has obtained from Mustang Tractor & Equipment Company, Houston, a model D375 Caterpillar diesel electric set, rated 200 kw, at 480 volts, which will be used to provide automatic standby power for the TV station.

PATSO Company, Houston, has obtained from Houston Engine & Pump Company, Houston, a model ED-201 Continental diesel rated 33 hp at 1800 rpm, which will be used in the company's offshore installation.

SALTERS & Carpenter, New Iberia, Louisiana, have purchased two model 6WAKDBSM Waukesha marine diesels, rated 260 hp each at 1600 rpm. They also bought two model 135DKBSM marine Waukesha diesels, rated 110 hp each at 1800 rpm. The four engines were furnished by Waukesha Sales & Service, Inc. Houston.

MID-CONTINENT Supply Company, Fort Worth, Texas, is installing two model 6FRDBSU Waukesha diesels on a drilling rig being outfitted for Loffland Brothers Company, New Iberia, Louisiana. The diesels, rated 490 hp each at 1100 rpm, were supplied by Waukesha Sales & Service, Inc., Houston.

WAM, Inc., Dayton, Texas, has secured from Big 3 Welding Equipment Company, Houston, three 300-amp Lincoln welding generators, each driven by a 2-cylinder, series 71, model 2055 General Motors diesel.

TODD Shipyards, Galveston, Texas, is placing a model D13000 Caterpillar diesel in one of the yard's Orton cranes. The diesel was sold by Mustang Tractor & Equipment Company, Houston.

WELDERS Equipment Company, Lake Charles, Louisiana, has bought two 250-amp Lincoln welding generators from Big 3 Welding Equipment Company, Houston. The units are powered by model DIX4D 4-cylinder Hercules diesels, rated 40.5 hp each.

BAROID Sales Division, National Lead Company, Houston, will power three centrifuge machines with as many model 190DLCU Waukesha diesels, rated at 66 hp at 2000 rpm. The diesels were bought from Waukesha Sales & Service, Inc., Houston.

GULFPORT Shipbuilding Company, Port Arthur, Texas, has purchased from Mustang Tractor & Equipment Company, Houston, two model D311 Caterpillar diesels, rated 65 hp at 2000 rpm, which will be used to drive as many Worthington rotary pumps.

ATLANTIC, Gulf & Pacific Company, Houston, has bought from Big 3 Welding Equipment Company, Houston, a 300-amp Lincoln welding generator driven by a series 71, model 2055 General Motors diesel.

DIXIE Drilling Company, Harvey, Louisiana, has secured through Bethlehem Supply Company, one model 135DKU Waukesha diesel, rated 106 hp at 1800 rpm and one model 6WAKDBU Waukesha diesel, rated 209 hp at 1600 rpm. Both diesels were sold by Waukesha Sales & Service, Inc., Houston.

INTERNATIONAL Minerals Corporation, Hobbs, New Mexico, is repowering another of its Jeeps in underground mining operations with a model 180DLC Waukesha diesel, rated 38 hp at 2000 rpm. The engine was furnished by Waukesha Sales & Service, Inc., Houston.

HILLMAN-Kelley Company, Houston, has secured two model ZD-129 Continental diesels rated 21 hp at 1800 rpm to power pipe tongs for drilling rig equipment. The diesels were sold by Houston Engine & Pump Company, Houston.

BURTON Construction & Shipbuilding Company, Port Arthur, Texas, has bought from Mustang Tractor & Equipment Company, Houston, a model D397 Caterpillar diesel-electric unit, generating 300 kw at 1000 rpm. The unit will see service on a barge drilling rig under construction.

COLUMBIA Drilling Company, Houston, is having installed on a drilling rig two model NKDBSU Waukesha diesels, rated 342 hp each at 1100 rpm. The diesels were furnished by Waukesha Sales & Service, Inc., Houston.

SUPERIOR Oil Company, Houston, through Alabama Dry Dock & Shipbuilding Company, has purchased from Big 3 Welding Equipment Company, Houston, two 400-amp, model S-9659 Lincoln welding generators, each powered by a series 71, model 2056 General Motors diesel.

PATTERSON Shrimp Company, Brownsville, Texas, has bought from Houston Engine & Pump Company, Houston, two model LDI Lister air-cooled diesels. The 1-cylinder 3½ hp engines will be used to provide deck power on shrimp trawlers.

BROWN & Root, Inc., Houston, has bought from Houston Engine & Pump Company, Houston, a model FR2 Lister water-cooled 5 kw ac diesel-electric unit

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The New 82-V vacuum pumping unit "with dry sight feed," an exclusive Manzel development will end your liquid sight feed problems. Install them on any existing Manzel lubricator. Now — more accurate than ever . . . it will pay you to get complete detailed information on this dependable, field-proven Manzel unit.
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which will be used by the company in its foreign service.

Control and Measurement System

Norwood Controls, Unit of Detroit Controls Corp., Norwood, Mass., announces the introduction of its new ElectroSyn system to the natural gas, petroleum, chemical processing and atomic power industries. ElectroSyn is a non-electronic signal generator system for the measurement, indication, transmission and control of a variety of process variables: pressure, differential pressure, flow, liquid level, temperature. Reliability combined with low maintenance and flexibility are cited by Norwood as the significant features which distinguish ElectroSyn from comparable existing systems.

This system can be installed and then enlarged upon to meet facility expansion. For example, if only local indication of pressure at a few points in a pipeline is required, the basic ElectroSyn system yielding only pressure indications may be installed. If subsequently it is desired to have information brought into a remotely located control station, an analog-digital converter and other necessary equipment can be added to the basic system. True null balance (infinite gain at zero frequency) is said to assure ElectroSyn's high degree of accuracy. Unlimited life is provided by electromagnetic transducers and magnetic amplifiers. The system is composed of three basic components: a signal transmitter (transducer), a power unit (magnetic servo amplifier) and a null-balance indicating receiver.

In measuring pressure, differential pressure or flow, the signal transmitter (by means of a twisted Bourdon tube for pressure or bellows for differential pressure and flow) converts the process variable into a shaft rotation of the ElectroSyn, a rotary differential transformer. Output from the ElectroSyn Transmitter is an a-c voltage exactly proportional to the variable (12 volts full scale). When measuring temperature, the signal transmitter is simply a temperature-sensitive resistor and the (feedback) ElectroSyn is replaced by a precision potentiometer. (ITS NEW)

Nordberg Appointments

Appointment of H. E. (Bud) Fellows as Manager of the Power Chief Engine Department to succeed G. B. (Burke) Wright is announced by R. W. Bayerlein, Vice President, Nordberg Manufacturing Company. Wright, who headed the Department since 1950, has been named District Manager of the Company's Great Lakes Territory and will concentrate on the sale of heavy duty Nordberg two-cycle and four-cycle engines for stationary and marine applications. Mr. Fellows joined Nordberg in 1950 and formerly was Manager of the Gasoline Marine Engine Department. He headed this Department for the past three years and previously was Assistant Sales Manager of the Department. Before coming to Nordberg, he had organized and operated a marine sales, service and storage business in northern Wisconsin. Fellows majored in Mechanical Engineering at the University of Wisconsin and served for three and one-half years in the U. S. Navy. Messrs. Wes E. Park and Phillip R. Coerper will continue as Sales Engineers with the Power Chief Diesel and Gas Engine Dept.

Appointment of Stephen H. Reed as Sales Engineer for Nordberg Manufacturing Company is announced also. Reed will make his headquarters at Houston, Texas and will work under the direction of Wayne Slife, District Manager of Nordberg's Houston Sales Office. Mr. Reed will place special emphasis on engine applications for gas and oil pipeline pumping stations and marine installations. He was formerly associated with Enterprise Engine and Machinery Company in San Francisco and recently served as District Manager of their Tulsa, Oklahoma office. Reed is a graduate Mechanical Engineer of Drexel Institute. He is a member of the American Petroleum Institute, Refinery & Transportation Division, Pipe Liners Club, Petroleum Club and Engineers Club of Tulsa.

Speed Reducer Line

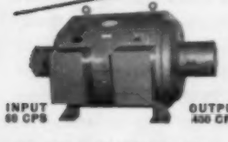
A new line of double and triple reduction speed reducers, with ratings up to 50 horsepower and efficiency ranges from 97% or better, have been announced by Western Gear Corporation of Lynwood, California. The new speed reducers bear the trade name "Strait Line" and are immediately available in all models. For full details write for Bulletin 5616. Address inquiries to Glenn Malme, Western Gear Corporation, P. O. Box 182, Lynwood, California. (ITS NEW)

KATO THE GENERATOR THAT FITS THE ENGINE OF YOUR CHOICE!

CHOICE OF FLEXIBLE COUPLINGS

ADAPTABLE TO ALL ENGINES WITH SAE BELL HOUSINGS

There is a size in the Kato line of generators with the electrical characteristics to meet your specific requirements. They hook up with any standard industrial diesel or gasoline engine by means of one of Kato's flexible couplings. All standard frequencies . . . 25-50-60 and 400 cycles plus many special frequencies to 1200 cycles (both fixed and variable). Now 400 cycles to 250 KW. 60 cycles to 500 KVA. One or two bearing designs. Extra lead wires brought out insure a maximum voltage selection.



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Wide variety of both fixed and variable frequency ranges starting at 25 cycles, up to 1200 cps. 400 cycle line now up to 250 KW.

Builders of Fine Electrical Machinery Since 1928

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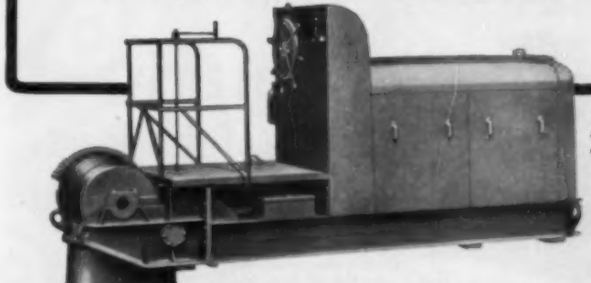
Harbormaster Outboard Propulsion and Steering Units move bigger payloads in less time and at less cost



Models from 40 to 400 h.p. Gas or Diesel

Harbormasters permit simplified hull design, more cargo space, bigger payloads, and more efficient crew operation. Outboard propulsion eliminates deadwood, stuffing boxes and rudder drag, and makes possible the use of a larger propeller, located farther aft of the hull. The result is more actual delivered thrust per H.P. than the same engine with an inboard system.

The advantages of Harbormaster Outboard Propulsion and Steering have been proved in better running speeds, shorter trip times, and greater payloads in hundreds of installations.

Harbormasters are rugged and powerful. They are a complete package . . . quick and easy to install on new or existing craft.

Complete 360 degree maneuverability. Steer effectively in any direction with full power.

Special elevating mechanism allows one-man operator to raise entire submerged assembly.

Shear pin lets tail section ride up and over any submerged obstacle, protecting it from damage.

Send for catalog which illustrates and describes in detail all the advantages of Harbormaster Outboard Propulsion and Steering.

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Please send me New Catalog giving details and showing many photos of Harbormasters in action.

Name.....

Company.....

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Mid-Continent Diesel News

By Jack F. Cozier

M & M Construction Co., Healton, Okla., has in operation at the Chikasha reservoir three Cat D8 tractors with bulldozers, four Cat DW21 tractors with scrapers, one Cat D9 tractor with push plate, one #12 Cat motor grader, and a #10 Cat wagon converted to a 5000 gal. sprinkler. All the equipment was purchased from Hoover Equipment Co., Oklahoma City, Oklahoma.

OTTAWA County, Fairland, Okla., bought a model 45 Allis-Chalmers motor grader for county road work. The unit was sold by the Boardman Co., Tulsa, Okla.

SHEEHAN Pipeline Company, Tulsa, Okla., has purchased two K-12 Insley cranes with Cat D3 diesel engines from Tulsa Equipment Co., Inc., Tulsa. The two units will be put into operation on pipe line work in the state of Pennsylvania.

FRANK Wheatley Pump & Valve Manufacturer, Tulsa, Okla., took delivery on an International U-264 diesel engine to power a Figure 1036 pump. The unit was delivered by Carson Machine & Supply Co., Tulsa.

WILLIAMS Brothers, Inc., Tulsa, Okla., has bought six Cat D315 diesel units from McCormick Machinery Co., Tulsa, for power units on pipe line construction.

OKMULGEE County, Okmulgee, Okla., purchased an Allis-Chalmers TS-200 motor scraper from the Boardman Co., Tulsa, Okla., for county road work.

PAUL R. Moody, Pauls Valley, Okla., has in operation two DW15 Cat tractors with scrapers and a Cat 955 traxcavator all purchased from Hoover Equipment Co., Oklahoma City, Okla. The units are being used for soil conservation work.

MARCUS Horn, Sapulpa, Okla., dealer for Carson Machine & Supply Co., Tulsa, Okla., bought three International U-1 diesel engines for installation on pumping jacks.

WILLIAMS Brothers, Inc. Tulsa, Okla., has bought two additional Insley K-12 back hoes powered by Cat D3 diesels from Tulsa Equipment Co., Inc., Tulsa. The units will be shipped to Turkey for pipe line work.

BELL Engine Service, Great Bend, Kan., has taken delivery on five 6MO-970 Allis-Chalmers gas irrigation power units from Buda Div., Allis-Chalmers Mfg. Co., Tulsa, Okla. They will be used for irrigation installation.

OKLAHOMA County, District #1, Oklahoma City, Okla., purchased two Cat DW15 tractors with scrapers and one Cat D7 tractor with bulldozer from Hoover Equipment Co., Oklahoma City.

BUDA Div., Allis-Chalmers Mfg. Co., Tulsa, Okla., shipped to Jennings Engine Supply Co., Oklahoma City, Okla., one Allis-Chalmers B-125 gas power unit, one 6MO-672 A-C gas power unit and one A-C HP-351 gas power unit for field installations.

STRICKLAND Transportation Co., Inc., Dallas, Tex., has in operation 52 White 9000 series tractors powered by Cummins JT-6-B turbodiesels on their runs from the Southwest into the East Coast.

HOUSTON Contracting Co., Houston, Tex., has taken delivery on their second Allis-Chalmers HD-16 tractor with Tractomotive side boom from the Boardman Co., Tulsa, Okla. This unit will also be used on pine line construction.

GASO Pump & Burner Mfg. Co., Tulsa, Okla., purchased an International U-169 diesel engine to power a pump drive. The engine was delivered by Carson Machine & Supply Co., Tulsa.

PAYNE County, Cushing, Okla., bought an Allis-Chalmers model 45 motor grader from the Boardman Co., Tulsa, Okla., for use on county road work.

FRED E. Cooper Co., Tulsa, Okla., received an Allis-Chalmers B-125 gas power unit for powering a pipe line pump, an A-C W-226 gas power unit for a pumping jack and an A-C 8MO-1290 gas power unit for pipe line installation from Buda Div., Allis-Chalmers Mfg. Co., Tulsa.

A. G. WISE Trucking Co., Inc., Grapevine, Texas, has in operation three Diamond T 723JT tractors powered by two Cummins HD 600 diesels and one JT-6-B Turbodiesel along with six International trucks with Cummins HB 600 diesels for hauling cable dump trailers loaded with crushed rock.

BELL Engine Service, Great Bend, Kan., purchased a W-226 Allis-Chalmers gas engine for a pumping installation. The delivery was from Buda Div., Allis-Chalmers Mfg. Co., Tulsa, Okla.

LAYMAN & Son, Tulsa, Okla., has bought a #12 Cat motor grader from McCormick Machinery Co., Tulsa. The unit will be used by these municipal contractors in construction of city streets.

New Marine Batteries

A complete new line of Willard 8-volt Marine batteries is offered by the Willard Storage Battery Division. The line has been completely redesigned, as a result of changing requirements in this rapidly growing market. Six new types are offered, a Super Master line, built with Willard's patented Silver-Metalex grid alloy, and a Heavy DeLuxe Line which contains Willard Metalex. These alloys resist both undercharge and overcharge,—in Marine use as well as in automotive applications.

The new Willard line is expressly designed for rugged dependability in 32-

James W. Owens, Jr., Manager (right), and Howard W. Clutts, Superintendent, of the M & A Electric Cooperative Plant, at Poplar Bluff, Mo., point with pride to one of the Young intercooler-equipped engines in their prize winning plant.

Young COOLERS serve REA Prize Plants for 6th Straight Year!

Once a champion—always a champion! Perhaps that is why the M & A Electric Cooperative found it easy for their Green Forest Plant, at Poplar Bluff, Mo., to repeat as Division B winner in the annual competition for efficiency among REA internal combustion plants.

And speaking of champions—count Young equipment in that class. For the sixth straight year Young cooling equipment has been an important part of the award winning plants. This year Young Intercoolers aided both the Poplar Bluff plant and the Division A winner—Thumb Electric Cooperative, Ubly, Michigan—to achieve the coveted honor for their Caro plant.

It just goes to prove—*where quality counts*—you'll always find Young heat transfer equipment!

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volt systems. Practical all important auxiliary power units, as well as lighting and signal equipment aboard ship are electrified—and depend on storage batteries. The entire system must be self-sustaining. For this reason, the new Willard Marine batteries are built with a generous reserve of capacity and power to meet all emergencies.

In addition to the 8-volt line described, the recently announced new Willard truck, bus, diesel line meets Marine requirements for 6- 12 volt applications. Willard also supplies a self-contained power-pack for electrically-started outboard motors in both 6- and 12-volt units. These new batteries, together with Willard's Super Master automotive types which meet Marine requirements for light craft provide practically complete Willard coverage in the Marine field.

ITS NEW

Impact Wrench

The Swench is a manually operated impact wrench developed by the Swenson Engineering Company of Branford, Connecticut. It incorporates the impact principle. The Swench has the ability of delivering torque values up to 20 times that applied to the handle by the operator, allowing a single operator to manually tighten to practical tensions bolts up to 1¾ in. in diameter according to the manufacturer. As the impact force can be controlled through a simple spring setting, any desired bolt tension can be produced by the operator through control of the impact force and the number of impacts applied to the fastening. The Swench has two drive extensions, one for loosening and one for tightening fastenings, and is operated like an ordinary ratchet wrench, using standard sockets to engage the nut or head of the fastenings. As the handle is pulled, a spring and rotor mechanism delivers rotary hammer blows or impacts automatically through the socket to the fastening, at torque values up to 20 times that applied to the tool handle by the operator. One impact or hammer blow is delivered for every 30° of movement of the handle. Impacts may be delivered in succession by continuous movement of the handle in one direction, or, by reciprocating the handle like a ratchet wrench, the operator can apply impacts singly or in short bursts. Each impact produces a clearly audible sound so that the number of impacts may be easily counted. This frees the operator of the necessity of having to read dials to reach predetermined stresses.

Control of the force delivered by each impact is achieved by the settings of an indicator on the head of the spring arbor. Through the combination of the control of the force of each impact and the number of impacts applied, any desired tension or stress can be produced in a bolt with a high degree of accuracy, without the need for special skill or care on the part of the operator. Charts are furnished which indicate proper springs settings and number of impacts required to produce desired stresses in various bolt sizes. The torque magnification characteristics of the Swench reduces the manual effort required in all bolting jobs, and permits a single operator to handle tightening and loosening jobs requiring high torque with ease and safety.

The Swench is presently available in 3 models. Model 500 fits ½ in. sockets, takes a range of bolts through ¾ in., is 11 in. long, weighs 4½ lbs and sells for $95.00. Model 750 fits standard ¾ in. sockets, takes a range of bolt sizes from ½ in. through 1¼ in., and is 16 in. long, weighs 10½ lbs and sells for $135.00. Prices and specifications on Model 1000, designed for 1 in. sockets, and for bolt sizes up to 1¾ in., are available on request. For further information write: Swenson Engineering, P. O. Box 43, Branford, Connecticut.

ITS NEW

Oil Pipeline Extensions

Big news in the operations of Union Oil Company's northern division this year is construction of a 16 in. pipeline that will connect the company's Oleum refinery, on San Francisco Bay with producing areas in the San Joaquin Valley. Some 180 mi. of new line are involved between Oleum and the existing northerly terminus at Coalinga. In addition, new capacity between Coalinga and Junction Station will be achieved with installation of 45 mi. of 12 in. line. Pumping capacity at new and existing stations will be provided by nine gas engines built by Enterprise Engine & Machinery Co.

Three of the new engines will be installed at Coalinga, and three more at the new Patterson station, about halfway along the new pipeline to Oleum. One engine will go into the existing Junction Station facility, and two more are slated for Santa Margarita. Junction Station, in the Lost Hills area, presently is served by lines coming south from the Coalinga producing area and north from the Taft-Maricopa-Bakersfield area. Santa Margarita is a station to the west, on the existing line from Junction Station to Union Oil's marine terminal at Avila, South of San Luis Obispo.

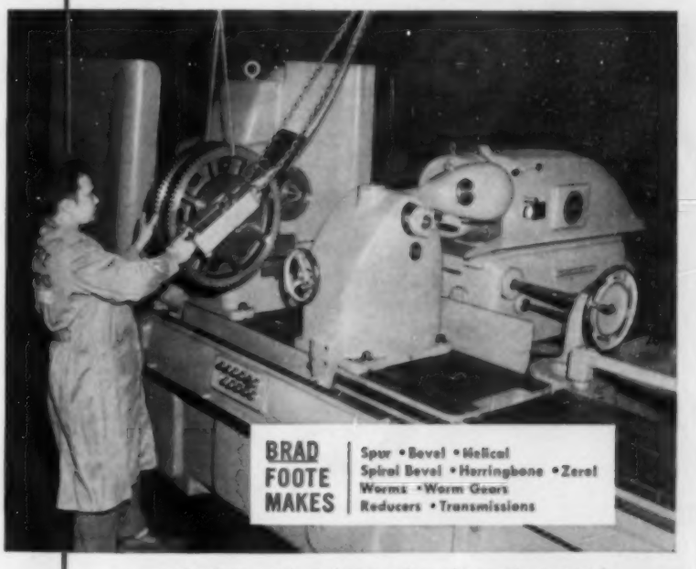
All the engines are Enterprise Series G, 6- and 8-cylinder models (12-in. bore, 15-in. stroke), normally aspirated and operating on natural gas. The engines for Coalinga and Patterson are all DGS G-8's, rated 855 hp at 550 rpm and 90 bmep. The new capacity at Junction Station and Santa Margarita will be provided by DGSG-6's, rated 600 hp at 540 rpm and 87 bmep. The pipeline project, involving 250 carloads of pipe, will be completed this summer. It will give Union Oil complete flexibility in handling both crude and semi-refined products to Oleum Refinery.

COMING MAY 15! The Brand New **DIESEL ENGINE CATALOG,** Volume 22. This giant, 400 page, 10½" x 13½" fully illustrated reference book containing complete and detailed engine and accessory sections is the biggest and best yet. **SPECIAL OFFER!** If you send in your cash order on or before May 15, you will receive a 10% discount on the Catalog price, which means it will only cost you $9.00 postpaid plus California sales tax where applicable, instead of the regular $10.00 price. Send your cash order now to **DIESEL PROGRESS,** 816 N. LaCienega Blvd., Los Angles 46, California.

SPECIAL MACHINES —MEN

2 Reasons Behind Brad Foote Quality

• The craftsman shown below is loading a gear into one of the latest additions to BRAD FOOTE'S long list of special-purpose machines. The only one of its kind in existence, this new shaver can straight or crown shave gears up to 51" in diameter. Normally accommodating gears with shafts up to 142" between centers, it can handle even longer shafts by using special journals. Specially designed, the new machine will shave either internal or external gears.



• Costly special machines such as this are important in providing the extra quality at lowest cost which is the hallmark of BRAD FOOTE gears. But these are only part of the story. Even more important, perhaps, are the men who man these machines—experienced craftsmen with long experience in producing gears to meet the most exacting and specialized requirements.

• BRAD FOOTE'S facilities are at your disposal whether you need one gear or a long production run. We would sincerely appreciate an opportunity to discuss your requirements or quote on your specifications. Your inquiry will receive prompt attention.

BRAD FOOTE GEAR WORKS, INC.
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Bishop 2-1070 • Olympic 2-7700 • TWX: CIC-2858-U

subsidiaries
AMERICAN GEAR & MFG. CO. Phone: Lemont 920 Lemont, Illinois
PITTSBURGH GEAR COMPANY Phone: SPalding 1-4600 Pittsburgh 25, Pennsylvania

Inland River Reports

By **A. D. Burroughs**

SNOW, fog, flood, ice, every winter obstacle descended on inland rivers this past winter, but transportation volume ran high, thanks to modern navigation aids along with dependable diesel propulsion.

MORE than a thousand inland river folks turned out for the annual Mississippi Valley Association meeting, St. Louis, in February. Caterpillar Tractor Company assistant to the president, Ralph J. Morgan, Peoria, Ill., was elected to serve as chairman of the MVA board, while Wade W. Hollowell, Greenville, Miss., was selected as 1957 MVA President.

THE Arnold V. Walker Shipyard, Inc., active since 1943, has been purchased recently by Ingalls Shipbuilding Corp., and will be operated as an affiliate yard as a part of Ingalls' small-boat construction expansion program.

ON THE water activities include *L. Wade Childress* back on the Ohio complete with new radar equipment. Owned by Mississippi Valley Barge Lines, she was built in 1948 by Dravo, with power by GM 16 cyl. engines for the total 3000 hp.

WE watched another Valley Line boat at Cairo, an old friend known as the *Northern*. Active since construction in 1950 at F. B. Walker yards, she is powered by Fairbanks-Morse OP 10 cyl. engines for the rated 3200 hp. Many river folks remember this one as the *Bernard B. Walker*.

THE COAL trade has been extremely heavy bringing out in full force the Ohio River Company's diesel fleet on the Ohio, including the new *City of Huntington, A. H. Crane, A. L. Long, John J. Rowe, Mike Creditor, OVEC, Walter C. Beckjord*, and the brand new *Queen City*, all equipped with Baldwin-Lima-Hamilton engines.

THE *R. H. Bosworth*, busy Ram-type boat was also active in the Ohio River coal trade. Owned by Point Towing Company, W. Virginia, this 1954 fleet addition built by Dravo receives its 580 hp from Superior engines handling remarkable tows for the size of the vessel.

AN old-timer, the *Clipper* was spotted sharing the volume in the coal trade. Built in 1924 by Nashville Bridge Company, it has been owned by Crain Bros., for the past 12 years, powered by General Motors engines. This 98x20 ft craft was originally named the *John C. Irwin*.

BY CONTRAST, the comparatively new *Jean Frances*, regularly seen on upper rivers, was handling a good volume of tows, using power developed from twin Caterpillar engines rated for a total 1000 hp. Owned by LaFourche Towing Co., this 1956 river addition was built by N. J. La Fort.

THE *Nancy Jane* was moving coal for Crucible. Built two years ago by Dravo for owners Campbell Barge Lines, Pittsburgh, power comes from Atlas Model 35 engines for the rated 550 hp.

SOUTHBOUND was the *Etta Marie*, 1956 production of Greenville Manufacturing and Machine Works for Port City Towing Company. Small in size, 72x40, she's a triple-screw, with three Cummins engines developing the total 1800 hp.

ENTERPRISE-powered *Sam Houston* was reported in Southern waters, near Greenville, Miss., using the rated 1700 hp from Enterprise 8 cyl. engines heading north, making upstream good time despite weather navigation worries. This nine-year-old built by St. Louis Shipbuilding Company has been a regular, a faithful performer along inland rivers.

CONSIDERABLE talk has been heard regarding the mobile off-shore drilling vessel *Mr. Arthur* recently christened at Alabama Dry Dock and Shipbuilding Co., Mobile, for Coral Drilling Co. Equipment includes a 1,000,000-pound derrick, and three Alco diesel engines of 1,000 hp each.

A SPECIAL thanks to a Minneapolis friend for the addition to our photo files of the excellent photo featuring a real beauty of a boat, the *Carcrosse*, owned by a Minneapolis company, Cargo Carriers. Built by St. Louis Shipbuilding and Steel Company, this modern towboat has been proving her power worth with big tows and fast time with power developed from twin Cooper-Bessemer turbocharged, aftercooled direct-reversing JS engines, for the total 2400 hp.

THE *Anna C.*, is now represented in our photo collection. Built by Bludworth Shipyard last year for Capt. J. D. Cayton, this craft is a versatile one, built as a tug, but equipped with the tow knee, with power from two Caterpillar engines for the total 600 hp.

Kenworth Trucks Purchased

Oilfields Trucking Company of Bakersfield, California, has purchased eight Kenworth Model 925 trucks which are now in service, according to an announcement by Lewis T. Gerlach, general sales manager for Kenworth Motor Truck Company of Seattle. Oilfields Trucking Company's newest highway trucks feature Kenworth's drop-frame front-end design, all aluminum construction and torsion spring tandem axle drive among their weight-saving features.

The full trucks, with loading space of 20 ft, six in., have a chassis weight of 13,140 lbs each, including water and all lubricants. These Kenworths are powered with Cummins NT-6-B turbocharged diesel engines delivering 250 hp.

Oilfields Trucking Company was founded in 1919 at Taft, California, by H. E. Phoenix and F. J. Phoenix. A third brother, P. A. Phoenix, joined the firm in 1925 to head Southern California operations from a new terminal at Torrance. Transporting all types of petroleum products on a yearly average of 2,500,000 miles per year, the firm serves California, Arizona and Nevada. One of the largest fleets of hot oil equipment in the West is owned by this company which operates some 100 units of equipment. The Kenworth order was placed through the Fresno branch of J. T. Jenkins Company, Kenworth distributor.

Giant Drilling Vessel

Ingalls Shipbuilding Corporation has started the construction of a new drilling vessel for Louisiana Offshore Drilling Company of New Orleans, which is headed by Dave Vasser and Alvin Howard. The drilling unit, of the submersible type, was designed by Friede & Goldman, Inc. Naval Architects and Marine Engineers of New Orleans, and will be the first of this type built.

Designed to drill in water depths up to 65 ft, the vessel will have a "spread-footing" type of stream-lined, scour resisting hull, pioneered by the designers.

More than one hundred Quincy Authorized Service Depots throughout the country carry adequate stocks of genuine factory parts for all models of Quincy Compressors. So wherever you are, you know you can put extra confidence in your Quincy Compressors. They're built to give you the kind of service needed for jobs like diesel starting, operating air tools and controls — designed to stand up under rugged field conditions. Depend on Quincy Compressors and Quincy service for all your needs from 1 to 90 CFM. Write Dept. K-55 for catalog today.

Quincy COMPRESSORS
FOR LOW COST AIR POWER
QUINCY COMPRESSOR CO., QUINCY, ILLINOIS

Stability during raising and lowering of the vessel at the drilling site will be obtained from cylindrical caissons located at the four corners of the vessel. While stabilizing tubes are of different shape than the buoyancy wing-walls of floating dry docks, their purpose and action are the same in assuring maximum stability. Thus raising and lowering is accomplished by pumping water in or out of the vessel, with no further mechanical device required.

The vertical columns which support the drilling and machinery decks will be of "Tri-Ten" steel, as will be the main strength trusses. Main hull structure is of mild steel. The superstructure utilizes considerable aluminum for deckhouse construction. Fuel, drilling water and potable water will be stored in the submersible hull. Crew quarters, offices, dining salon and recreation room will be air-conditioned. A helicopter landing deck will be provided over the deck house. An interesting note is that the hull receives no external painting whatsoever, full reliance being placed on cathodic protection.

Principal Vessel Characteristics:

Length over all	180 ft 0 in.
Beam of hull, molded	151 ft 0 in.
Depth of hull	12 ft 0 in.
Slot length	34 ft 0 in.
Slot width	32 ft 0 in.
Clearance of lowest deck above hull bottom	82 ft 0 in.
Quarters	44 men

Drilling power is provided by an Alco Products – General Electric Co. diesel electric power plant, similar to that employed on the Coral Drilling Company and Delta Offshore Company mobile drilling vessels. Provision has been made for a Schlumberger well surveying and logging unit, and a Halliburton cementing plant will be installed. Drilling machinery will consist of a Lee C. Moore 140 folding mast having a capacity in excess of 1,000,000 lbs, with a Unit Rig model 1220 drawworks, two Emsco D-1000 mud pumps, and other equipment all supplied by Mid-Continent Supply Company. The rig will be capable of drilling to 20,000 ft or deeper.

In accordance with the desires of the Louisiana Offshore Drilling Company the utmost attention has been given by the designers to obtain simplicity, reliability and safety. The vessel is being built to special classification and inspection of the American Bureau of Shipping. Applicable regulations of the U. S. Coast Guard and other governmental agencies have been followed in the design. Delivery is scheduled for September 1957.

Engine Rating Chart

International Harvester has just announced a rating chart for its line of 17 engines and power units. This chart offers brake hp on engines without fan or accessories, and on power units with fan and accessories. The hp ratings are corrected to standard conditions at sea level (29.99 in HG) and 60 degrees F.

A separate page lists the extensive number of typical applications possible for the IH units. For your copy, address: CR-522-G, International Harvester Co., Construction Equipment Div., 180 N. Michigan Ave., Chicago 1, Ill.

ITS NEW

375 HP Turbopower Unit Featured

Detroit Diesel Engine Division of General Motors will introduce its new 375 hp diesel engine to the mining industry at the American Mining Congress Coal Show in Cleveland, May 13-16. The new diesel is a six-cylinder 110 unit which utilizes an exhaust-driven turbine and air impeller to supplement the air supply to the cylinders. The result is increased efficiency and horsepower increases up to 25 per cent with no increase in weight-to-horsepower ratio. The unit was developed to meet increasing demands for an engine of high power output in a comparatively small, light-weight package.

Other models to be displayed by Detroit Diesel include a 236 hp Turbopower Series 71 engine, a Diesel-electric set rated at 125 kw, torque converter and Hydrostarter models. Two activated cutaway units showing the two-cycle operation of Detroit Diesel's 6-71 Turbopower and new 6-110 Roots blower models will also be shown. Detroit Diesel's display will be located in booths 2013 and 2122 in the upper Lakeside Hall of Cleveland Public Auditorium.

Zone Sales Manager

The Detroit Diesel Engine Division of General Motors has appointed J. T. Hanna zone sales manager of its Chicago region. Mr. Hanna, formerly associated with the Division's Western region, succeeds S. C. Partel who is now a sales representative for Detroit Diesel in Washington, D. C.

DIESEL ENGINES NEED
Supercharged Power

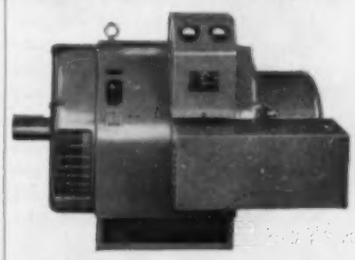
MIEHLE-DEXTER SUPER-CHARGERS
INCREASE HORSEPOWER, TORQUE,
ACCELERATE YOUR ENGINES FASTER

Wherever Diesel engines work—buses, tractors, trucks—a Miehle-Dexter Supercharger adds a big boost to performance. Power is increased by the simple addition of this compact, space-saving supercharger. That means *extra* speed at any load, *extra* pushing or pulling power at any speed, wider speed range. More, it means faster acceleration with less smoke. Add all this to engines without increasing size, weight or cost. In fact, weight per horsepower is decreased. Standard M-D models available for most engine applications. For more facts, call or write Miehle-Dexter.

Soon available AN ENTIRELY NEW TYPE OF TURBOCHARGER

MIEHLE md DEXTER
Supercharger Division of
The Christensen Machine Co.
116 Fourth St., Racine, Wisconsin

Get the latest!
A COMPLETELY NEW "PACKAGED" GENERATOR
AMP-PAK



AMP-PAK Generator shown is rated at 187 kva, 1200 rpm, 240/480 volts. AMP-PAK is available in ratings of 75 thru 187 kva at 1800 rpm and 62½ thru 187 kva at 1200 rpm. Three phase, 80% PF, 60 cycles, 50C rise, and 120/208, 240 and 480 volts.

No exciter . . . No moving parts in the voltage regulator

AMP-PAK is a compact, revolving field a-c generator with built-in, static excitation system; static voltage regulator; and basic metering and controls conveniently grouped. AMP-PAK is a portable unit, factory assembled, internally connected, and tested.

No rotating exciter to maintain. D-C excitation is provided by a heavy duty, long-life, static rectifier.

No tubes, relays, vibrators to service. Voltage is regulated by a static, E-M-developed sensing circuit and "magical" magnetic amplifiers.

Holds voltage "rock-steady" so your motors, lights, and electronic equipment will work better. The static regulator provides ±2% regulation.

Starts big motors. A special, built-in voltage booster transformer stands by to reinforce line voltage when heavy loads are suddenly applied.

Easy to install. Needs no switchboard. Just connect load to AMP-PAK thru a suitable line switch.

Simple to operate. Has no belts, no "tricky" commutator, no adjustments – anyone can operate AMP-PAK.

See your nearest E-M Sales Engineer and write the factory for publication PRD-236.

E-M
ELECTRIC MACHINERY MFG. COMPANY
Minneapolis 13, Minnesota
Largest manufacturer of "Packaged" Generators
2100-TPA-2154

Offshore Taxis

A marine rental business that started out in 1950 in Rockport, Texas with three 26 ft gasoline engine-driven crew boats, two of these run by the partners themselves, has burgeoned into an offshore taxi organization that boasts ownership of seven craft and a contract to operate another for a major oil company. This is the Caspary-Wendell Boat Works headed by Del E. Caspary and Jerry Wendell, the largest and oldest crew boat rental operator south of Galveston. There is no doubt the key to the company's success is the thoroughness with which it has entered the field of personnel transportation for offshore operations of the oil industry. All Caspary-Wendell boats are designed to carry drilling crew members and other personnel to and from the drill-sites with a maximum of speed, safety and comfort.

The fleet, which as a whole contains 22 GM diesel engines, is equipped with two-way radios and two large boats have radar installations. Examples of Caspary-Wendell service are the *Whirlaway* and *Chevron*, the former owned by the company and the latter operated for Standard of Texas. These are fast crew and gauging boats providing both stability and versatility. The *Whirlaway* was timed in a measured mile at the rate of 20.5 miles an hour.

Twin-screwed, she is of all-welded steel construction with an overall length of 93 ft and a beam of 20 ft. Main engines are a matched pair of GM tandem-twin 6-110 marine diesels equipped with GM 3:1 ratio hydraulic reverse-reduction gears. Passenger salon, which seats 20, is air conditioned and equipped with airplane-type seats, game table, and toilet with marine commode and lavatory. A roomy all-electric galley is forward of the wheelhouse. The GM Diesels operated by Caspary-Wendell are six 2-71s, eight 6-71s and eight 6-110s. Besides the *Whirlaway* and the *Chevron* there are available for immediate service the *Lightening*, *Jewel*, *Hornet* and *Wasp*, all 40-footers; the 65 ft *Man O' War* and 85 ft *Beppy*.

Water Separator For Fuel Lines

Diesel fuel users who have had the sad experience of power failure due to the presence of water in the fuel tanks will be interested in Sudbury's new transparent Water Stripper, which is scientifically designed to prevent damage to strainers, filters, injectors, engines, etc. When water is present in the fuel tank, the combination of fuel and water forms a semi-sulphuric acid condition which may actually destroy parts of the fuel system. Because condensation, due to atmospheric temperature changes, can not be prevented from forming in diesel, gasoline or domestic fuel tanks, fuel can literally become "loaded" with water which must be removed if serious damage is to be avoided.

Sudbury Water Strippers are designed as a double-action separator. First, water and impurities are decanted from the fuel because the large cylinder of the stripper reduces the velocity of the fuel and acts as a settling chamber. Flow of fuel through the unit is directed so that most of the water and impurities settle to the bottom of the cylinder. Second, the fuel is forced through a chamois-like filter paper and plastic screen, removing the last trace of water, according to the manufacturer. Actually the Sudbury Water Stripper provides a "pre-filtering" of the fuel so that most impurities as well as water are removed.

Made of transparent lucite, the Sudbury unit permits the operator to see at a glance just how much water has been removed and whether or not the filter-chamois needs replacing. Filter-chamois paper and plastic screen are easily removed for cleaning or replacement without disturbing the unit. While Sudbury Water Strippers are made in two basic

sizes, Model A with a rated capacity of 20 gallons of light fuel oil per hour, and Model B, designed to handle up to 50 gallons of fuel per hour, they may be made to handle any desired gallonage on special order.

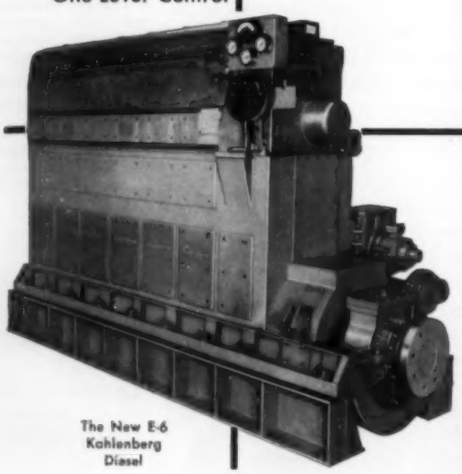
ITS NEW

Ultra Modern
High Output
Less Weight Per HP
Low Piston Speed
Low Fuel Consumption
Low Noise Level
Positive Reverse
One Lever Control

Kahlenberg

TURBOCHARGED DIESELS

- QUIET RUNNING—OUTSTANDINGLY SMOOTH
- DIRECT DRIVE AND DIRECT REVERSIBLE
- CONSERVATIVELY RATED AND ECONOMICAL
- WELDED STEEL FRAME CONSTRUCTION
- NEAT AND COMPACT



The New E-6 Kahlenberg Diesel

The Model E Series Kahlenberg Diesels are high output, heavy duty, low speed engines employing the pulse system of exhaust turbocharging in a two stroke cycle, uniflow scavenging, ultra modern design utilizing welded steel frame construction with short overall length, compactness, and full length base for easy installation.

These engines are available for marine service, direct or geared drive, in units to eight cylinders rated up to 1100 HP and 400 RPM. Your inquiries are invited.

KAHLENBERG BROS. CO.

1200-1300 Twelfth Street, Two Rivers, Wisconsin

MANUFACTURERS OF KAHLENBERG DIESELS, AIRHORNS, PROPELLERS, AUXILIARIES

Catalog on Power Units

The Detroit Diesel Engine Division of General Motors has issued a 19-page catalog outlining its complete line of power units for all types of industrial applications. Specifications are given on 31 engine models ranging from 44 to 761 brake hp including the Division's new six-cylinder Turbopower engine.

Copy of the new catalog may be obtained by contacting Detroit Diesel distributors and dealers or by writing Detroit Diesel Engine Division, General Motors Corporation, Detroit 28, Michigan. (ITS NEW)

Diesel Batteries Bulletin

Gould-National Batteries, Inc., Trenton 7, N. J., has just issued Bulletin No. GB-1078B which describes the Gould Kathanode diesel locomotive starting battery that has been engineered to fill the heavy power requirements needed in diesel starting. It gives full details of battery construction, including Tite-Seal posts, heavy duty diamond "Z" grids, regenerative oxide, porous platainers and separators, glass retainers, element protectors, and Monobloc containers. The ten-page bulletin lists complete engineering specifications with ampere hour capacities, unit dimensions and approximate battery weights. Connecting diagrams and application for various models of diesel locomotives are also given.

Announces New Power Unit

A new model diesel unit—the UD-281—has been announced by International Harvester's Construction Equipment Division. The 4-cylinder unit has a 60-hp rating at 1800 rpm, five more hp than the UD-264, its predecessor, the firm discloses. This smallest of six diesel units in the International line has a piston displacement of 281 cu in., with a 4-1/8 x 5-1/4 in. bore and stroke. (ITS NEW)

New Taylor Bulletin On Their Balancing Machine

A new bulletin (SB-1) on Taylor HI-EFF Precision Balancing Machines has just been released by the Taylor Dynamometer and Machine Company of Milwaukee, Wisconsin. This eight-page, two-color booklet shows graphically and pictorially the operation and advantages of Taylor HI-EFF Balancing Machines, including a cutaway sequence that visibly reveals "the inside story of Taylor HI-EFF'S superiority." The ease of semi-automatic operation which "Speed-Button Control" gives to Taylor HI-EFF balancing equipment and the versatility which HI-EFF'S spindle design affords are also described in the bulletin. Specifications including balancing machine capacities and dimensional data are given along with photographs of typical piece-parts that can be balanced on Taylor HI-EFF'S equipment. In the event that parts cannot be sent for sample balancing, the bulletin contains a listing of the information required by Taylor engineers in order to make recommendations for solving balancing problems. (ITS NEW)

Eccentric Valve Seat Grinder For Detroit Diesel Engines

Reactivation of the eccentric valve seat grinder for Detroit Diesel engines, together with release of a new adapter set for the four-valve heads, has been announced by Kent-Moore Organization, Inc. Designers and manufacturers of special service tools, the Jackson, Mich., organization said the grinder is reactivated under the new number J-8165, replacing the KMO 167D. The eccentric grinder works on all series automotive gas and diesel engines when used with the proper pilots and grinding wheels, and is built to enable a service shop to achieve the same precision finish job accomplished at factory level. Utilizing the point-contact grinding principle, it grinds valve seats without waste. More seats can be ground per wheel with less frequent stone dressing because of the micrometer feed. The micrometer feed also gives greater accuracy and less wheel breakage and constant action than does the hand feed stop-and-start method. A valve seat dial gauge, accurate to one thousands of an inch, is included in the set for checking seat wear and finish grind. Announced with the J-8165 grinder is a new adapter set consisting of the proper pilot and wheels for use on Detroit Diesel's new four-valve head Series 71 engine. (ITS NEW)

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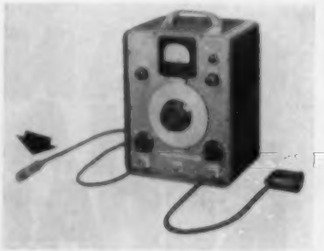
NEW PRODUCT NEWS



Kistler Indicator Measures Engine Pressure Changes Quickly and Precisely

Featuring high sensitivity and extremely fast response, the new precision-made Kistler SLM Engine Pressure Indicator has been designed for research, engineering, testing and evaluating diesel, gasoline, gas, jet, rocket and atomic engines. It is rapidly being adopted by the automotive, aircraft, engine and fuel industries.

Pressure changes generating an electrical charge in the Swiss-made SLM Pressure Pickup are measured by an electrostatic type amplifier and displayed on an oscilloscope. Small pressure variations in overall cylinder diagrams can be magnified as much as a thousand times. Rugged enough to withstand diesel combustion and other temperatures up to 600° F, without special air or water cooling, the pickup will measure combustion pressures for all ranges, 0.1 through 3000 psi. With the addition of a Kistler adaptor, fuel injection pressures to 20,000 psi can be measured.

The ability of the SLM Indicator to measure directly either *pressure* or *rate* of pressure changes, makes it invaluable for fuel, combustion and detonation studies, load balancing, monitoring, peak pressure adjustment on production engines, and maintenance or repair operations. The most advanced engine analyzer available, it can be operated as readily as a TV set. Trouble shooting and ignition or injection timing are greatly simplified. Optional equipment includes a selector switch which permits operation of several pressure pickups with a single amplifier-calibrator unit, and a piston displacement indicator for direct display of traditional indicator diagrams.

For complete information on the SLM Pressure Indicator, including Swiss-made SLM Pickup, special low-noise cables and the Kistler "Piezo-Calibrator" (amplifier-calibrator), request Bulletin EPI-114.

Kistler Instrument Corp., Dept. DP, 15 Webster St., North Tonawanda, N.Y.

why are contractors enthusiastic about . . .

ROOSA MASTER

The answer is simple. Here is one, expressed by a satisfied user, Tully & DiNapoli Inc., New York General Contractors:
"We have completed our fourth year with the ROOSA MASTER fuel pump on our Truck #157. We installed this pump on an HB-150 horsepower Cummins engine in November 1952. Six months later we converted this engine to an HR-165 horsepower and two years later we overhauled the engine. No repair work was done on the pump during that time other than a change of calibration.
Now we have ROOSA MASTER pumps on other engines. We are very enthusiastic about the performance and economy of the fuel pump and are continuing to change over our entire fleet."

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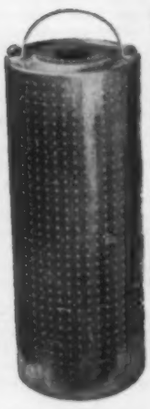

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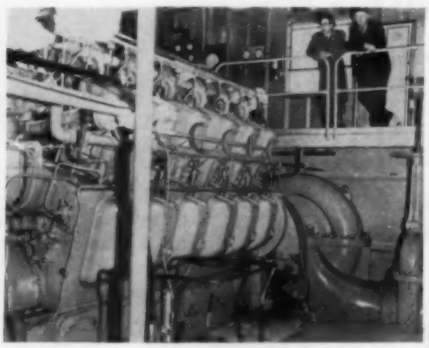
Alco Dual-Fuel Installation

The first dual-fuel 12-cylinder diesel engine in Alco Products, Inc.'s series of Model 251 units has been placed in service by the Lukens Steel Company. The basic engine is Alco's Vee-type 1800-hp power unit modified for dual-fuel operation and rated for the Lukens application at 1380-hp at 900 rpm. The installation marks the second dual-fuel application of a 251 engine—a 16-cylinder unit previously having been installed at a pipeline-pumping station in the Midwest.

The 12- and 16-cylinder Vee-type engines, with a companion, in-line 6-cylinder model, were introduced last year and already have found application in a variety of stationary and marine installations.

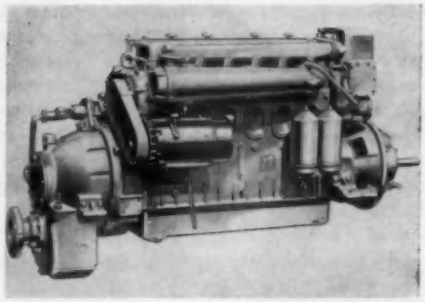
They also power all of Alco's current production of diesel-electric locomotives. Lukens Steel uses the 12-cylinder engine to pump water, to reduce peak loads on its electrical supply system, and as a standby when maintenance work is required on its electrical pumps.

In pumping service, the engine powers a 20,000 gpm pump drawing water from a plant reservoir to the steel mills' furnaces. Lukens reports the engine is operated about three days a week and terms its performance "very satisfactory." The engine is started with diesel oil, but 92.5 per cent of its fuel, once it reaches running temperature, is natural gas. Dual-fuel operation provides a significant saving in fuel costs in areas where natural gas is economically advantageous. To accommodate the engine and pumping equipment, Lukens erected an inexpensive galvanized steel building with a comparatively light foundation for the engine. The 12-cylinder Model 251 engine weighs 34,500 lbs dry. (ITS NEW)



Alco Model 251, 12 cyl. diesel in main pumping station at Lukens Steel Company plant in Coatesville, Pa. Watching from platform are Verdun R. McGibbon (left), Lukens design engineer, and William E. Gilbert, mechanical dept. foreman.

6-71 Workboat Model



The Detroit Diesel Engine Division of General Motors has announced a new Series 71 "E" model for work boats which develops 15 per cent more continuous hp than comparable models in the Division's line and has its full throttle output fixed at its most efficient, day-to-day rating. This increased rating is a continuous 170 shaft hp attained with substantial operating economies brought about by a ten per cent improvement in specific fuel consumption.

Largely responsible for the model's increased efficiency is improved combustion resulting from better engine breathing. This is brought about with a minimum number of mechanical changes in the Series 71 engine. Larger air-intake ports substantially increase the supply of fresh air forced into the cylinders by the engine blower while an increase from two to four in the number of exhaust valves per cylinder provides a faster and more complete discharge of exhaust gases. The fixed continuous horsepower rating on the new model is accomplished at the factory by limiting the fuel input. This is an outstanding feature which contributes substantially to longer engine life. Installed in a properly wheeled boat the engine works constantly in its most efficient operating range and this is an important economy feature.

The new model is a six-cylinder unit which retains the small size and low weight-to-horsepower ratios of all Detroit Diesel two-cycle engines. It

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is available in both starboard and port models (6071E and 6072E) with GM reverse and reduction gears ranging from 1:1 to 4.5:1. Complete specifications may be obtained by contacting Detroit Diesel marine distributors or dealers or by writing the Detroit Diesel Engine Division, General Motors Corporation, Detroit 28, Michigan. ITS NEW

Hose Assemblies Line

A new line of Teflon Hose Assemblies of superior flexibility has been placed on the market by the Flex-O-Tube Division of Flexonics Corporation, Maywood, Illinois. Constructed of smooth extruded Teflon tube with stainless steel wire braided covering, the new hose is designed to withstand working pressures up to 3,000 psi under certain temperature conditions and temperatures to 500° F. when working pressures are not above 1,000 psi. The high tensile strength of the Flex-O-Tube Teflon Hose Assemblies, permits smaller outside diameter, effecting a saving of both weight and space. The same characteristic gives Flex-O-Tube Teflon hose high resistance to vibration and protects against fatigue failures.

Both conventional straight and elbow fittings as well as special shapes are available on the hose assemblies—in aluminum alloy for lower temperatures and in cadmium plated steel or corrosion resistant stainless steel for high temperature, high pressure applications. Application data is available on request from the Flex-O-Tube Division. Company engineers will make recommendations on special application problems. Available in sizes from $\frac{3}{16}$ to $1\frac{1}{8}$ in. ITS NEW

Worthington Power Fair

A very successful and unique industry equipment demonstration was held recently in Buffalo, N.Y. before a gathering of over 200 representatives from 119 leading gas pipeline and process industry companies of North America. From all over the United States, Canada, and Mexico, where oil and natural gas products producing, processing and transmission are prime industries, these key engineers met to attend Worthington Corporation's 1957 Power Fair from March 6th through 8th. There, they heard engineering discussions and saw demonstrations of Worthington's newest power engines and engine-compressors.

Extensive preparations had been made to make every visiting minute count. Exhibits, signs, and working models of component parts had been set-up. E. J. Schwanhausser, Worthington's president, greeted the visitors as they registered at the Buffalo Athletic Club for the morning sessions. Technical information kits containing all of the details of the Power Fair and of the engine and compressor equipment demonstrated later at the manufacturing plant were distributed to the guests. In the discussion room a projection unit was set up to illustrate the design, application and operational features of the new power products. During the morning session discussions were conducted by Worthington executives on the Model SLHC, the first turbocharged four cycle engine-compressor of its type; the Model SUTC, a completely exhaust powered turbocharged two cycle compressor engine; and the Models SW 9 and SW 14, high output four cycle power engines.

Visitors witnessed actual performance of engines operating at different loads and speeds. Here the SUTC turbocharged two cycle engine is put through its paces

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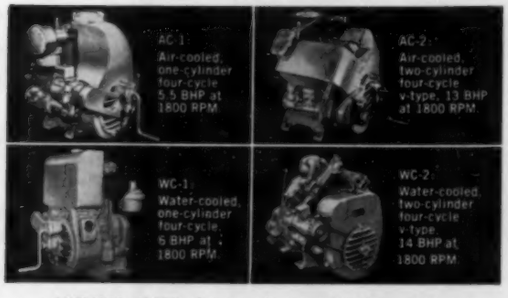
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AC-2: Air-cooled, two-cylinder four-cycle v-type, 13 BHP at 1800 RPM.
WC-1: Water-cooled, one-cylinder four-cycle, 6 BHP at 1800 RPM.
WC-2: Water-cooled, two-cylinder four-cycle v-type, 14 BHP at 1800 RPM.

AMERICAN MARC also manufactures Diesel generating plants from 3 to 10 KW (AC or DC, and industrial three-phase), Diesel pumping units from 4 to 1700 GPM, marine propulsion, refrigeration units and power-packages for other services. American MARC can adapt any of its Big 4 engines to fit every job requiring from 5 to 20 BHP.

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Clark Fork Truck

A 20,000 lb capacity pneumatic-tire fork truck featuring four-wheel drive and finger-tip direction controls has been announced by the Industrial Truck Division of Clark Equipment Company. Named the Ranger-200, the machine is designed for heavy duty in mud and over rough terrain. A four-speed, power shift transmission and a torque converter with 3-to-1 multiplication are coupled with a 143 hp General Motors diesel engine for maximum power under adverse conditions. Four-wheel or two-wheel drive is obtained by moving a selector lever. All wheels are equipped with big 14.00 by 24 tires.

Direction control levers are located on the steering column within finger-tip reach of the operator. A single lever, also on the steering column, controls lifting and tilting movements. Power steering is standard. In addition to four-wheel, power-assisted hydraulic spot-type disk brakes, a separate parking brake is mounted on the front drive axle.

The Ranger-200 has an underclearance of 14 in., and will travel 25 mph in both forward and reverse. Its turning radius is 312 in. Wheelbase is 108 in. Length, less forks, is 207 in. Width over dual tires is 119 in. and width over rear wheel hubs is 102 in. Empty weight is 32,470 lbs. More information on the Ranger-200 can be obtained by writing to the Industrial Truck Division, Clark Equipment Company, Battle Creek, Mich.

Government Appointment

The appointment of Carl O. Friend of the Nordberg Manufacturing Company, Milwaukee, Wisconsin, as Director of the Power Equipment Division, Business and Defense Services Administration, U. S. Department of Commerce, was recently announced by BDSA Administrator H. B. McCoy. Mr. Friend is on loan from his position at Nordberg as Administrative Manager of the Company's Heavy Machinery Division, and will serve without compensation from the Government for a period of six months under the rotation system currently in effect. In recent years the Power Equipment Division has operated with various industry representatives serving as its Director for a six month period. The Diesel Engine Manufacturer's Association was called upon to furnish a representative for 1957 and Mr. Friend was selected.

In announcing his appointment Mr. McCoy said that the new Director brings to BDSA current knowledge of the diesel engine industry and heavy machinery field, which well qualifies him to manage the various activities of the Power Equipment Division. The BDSA is responsible for carrying out the Department's programs relating to current defense production, long-range industrial preparedness, and service to the business community. Past experience has shown that this cooperative effort between government and industry has been a successful operation with mutual gain for each in addition to cementing industry-government relations.

Aerosol Degreaser Spray

Grease, oil, carbon, tar, gums and similar difficult to remove substances can now be easily, quickly and safely removed by a new aerosol degreaser that is designed for use on all types of machinery and electrical equipment. Simply spray Zipp on the area to be cleaned and within a minute you can either wipe the object clean with a rag, or, if not electrical, hold it under a water faucet and rinse it off, according to the manufacturer.

Zipp is designed for cleaning motors and other electrical equipment, oily ma-

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SPECIAL OFFER: If you send in your cash order on or before May 15, you will receive a 10% discount on the price of the DIESEL ENGINE CATALOG, which means it will cost you only $9.00, instead of the regular $10.00 price. Only cash orders will receive this discount.

chinery, and other mobile equipment. It will remove greasy stains from painted surfaces, and concrete floors. Zipp dries rapidly, leaving no film or vapor. It will not short electrical equipment, is non-corrosive and non-flammable, and is safe for painted surfaces. It does not contain carbon tetrachloride. Packing is 16 ounces net weight per can. For additional information, write to Stewart-Hall Chemical Corp., P. O. Box 66H-6, Mount Vernon, New York. (ITS NEW)

Instrument Air Filters

Dependable precision operation of pneumatic control systems and processes requiring air is assured when the air is micronically clean. New instrument air filters, announced by the Air-Maze Corporation, are designed to remove fine dirt particles and entrained liquid droplets from compressed air streams are available in two types. Where processes or instruments require relatively small quantities of extremely clean compressed air, instrument air filters with special felt type filter media are used. Efficiencies of over 95% on particle sizes down to 1 micron are indicated by actual test, according to the manufacturer.

When air temperature at filter is over 200°F, instrument air filters of metal media type are recommended. Built of metal disc type design, these instrument air filters operate under the higher temperatures with no change in performance characteristics. Metal disc construction also greatly extends filter area, providing initially low pressure drop and long service period before pressure drop builds up. All particles larger than wire screen openings are effectively trapped by fixed openings on metal disc type filters. Particles smaller than opening sizes are also stopped. Air Maze reports that 96.5% filtration efficiency can be attained on particles 10 microns and over for media with nominal opening of 33 microns.

Instrument air filters with metal discs of wire screen are available in nominal opening sizes from 246 to 33 microns. Special materials can be furnished for use in corrosive atmospheres. Full details in Bulletin IAF-856 available by writing the Air-Maze Corporation, Cleveland 28, Ohio. (ITS NEW)

Electric Plants for Construction Work

How 28 Onan electric generating plants supply power for a difficult tower construction job in Northern Minnesota is told in a special issue of *Power Points Digest*, company publication of D. W. Onan & Sons Inc., Minneapolis, Minn. This latest issue of Onan's external magazine describes applications of Onan Electric Generating Plants in interesting and unusual construction jobs. Read how home builders in Minneapolis use a variety of Onan models to speed work on large construction projects . . . how the Hallett Construction Company uses 28 units for a multitude of jobs in the construction of a 32,000-volt powerline for the Erie Mining Company.

Manufacturers, too, rely on rugged Onan Plants as a source of electric power on their original equipment . . . as is described on Page 8, where the Manitowoc Engineering Corporation's heavy-duty shovel crane is shown in action. How Onan diesel electric plants supply power for lights on an around-the-clock construction project for Morrison Knudsen Co. is described, as is a self-contained portable floodlight tower operating on the St. Lawrence Seaway excavating job . . . where an Onan 10kw Model CW generating set provides the source of power. This 2-color, 12-page booklet is free for the asking. Write D. W. Onan & Sons Inc., Minneapolis 14, Minnesota. Ask for *Power Points Digest*, Volume 12, No. 2.

DIESEL ENGINE CATALOG

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The size and format of Volume 22 of this "Bible of the Industry" will be the same as in previous years—a big 400 page book with easy to read page size of 10½" x 13½". The large, wide open format makes reference simple and quick. Each section is fully illustrated with photographs, power curves, specifications charts, and sectional views, as well as full description in the text of the products and their fields of application. You cannot afford to be without it in your business. Be sure of your copy as soon as the Catalog is off the press, by ordering Volume 22 now!

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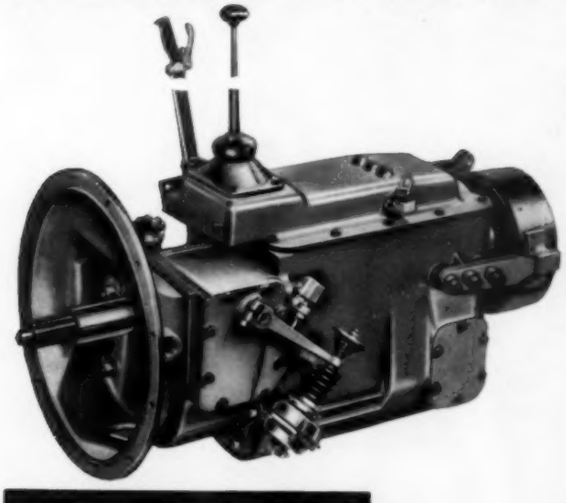

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- Increases transmission life—reduces shock loads. Less downtime for repairs.

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Although oversized for present needs, this 8 cylinder Cooper-Bessemer will more than justify its original cost. Dependable, economical power will be available for many future years. And as Lake Crystal power demands grow . . . this JS will easily handle the increased load. No need for costly plant expansions. No new engines to buy.

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